AD-A126 235 GENERALIZED MONITORING FACILITY USERS MANUAL CHANGE 5 1/2
(U) COMMAND AND CONTROL TECHNICAL CENTER WASHINGTON DC
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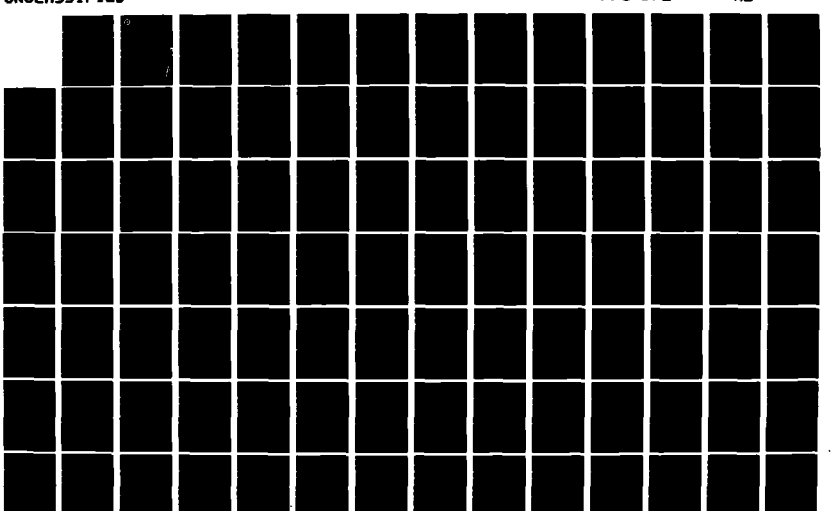

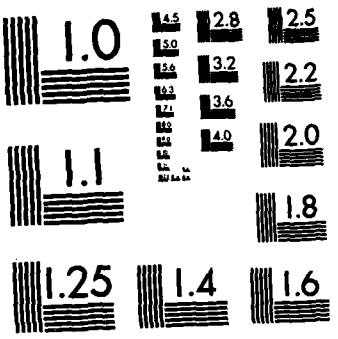

DEFENSE COMMUNICATIONS AGENCY
COMMAND AND CONTROL TECHNICAL CENTER
WASHINGTON, D. C. 20301

(12)

IN REPLY REFER TO: C751

1 April 1983

TO: RECIPIENTS

SUBJECT: Change 5 to Computer System Manual CSM UM 246-82, Generalized Monitoring Facility

1. This is Change 5 to Computer System Manual CSM UM 246-82, Generalized Monitoring Facility, dated 1 May 1982. Remove obsolete pages and destroy them in accordance with applicable security regulations and insert new pages as indicated below:

Remove Pages	Insert New Pages
Complete Table of Contents	Complete Table of Contents
xxix	xxix
2-5 and 2-6	2-5 and 2-6
2-11 and 2-12	2-11 and 2-12
2-13 and 2-14	2-13 and 2-14
2-15 and 2-16	2-15 and 2-16
4-3 and 4-4	4-3 and 4-4
4-25 and 4-26	4-25 and 4-26
4-27 and 4-28	4-27 and 4-28
5-5 and 5-6	5-5 and 5-6
5-7 and 5-8	5-7 and 5-8
5-11 and 5-12	5-11 and 5-12
5-13 and 5-14	5-13 and 5-14
5-15 and 5-16	5-15 and 5-16
5-17 and 5-18	5-17 and 5-18
5-45 and 5-46	5-45 and 5-46
5-46.1 and 5-46.2	5-46.1 and 5-46.2
5-55 and 5-56	5-55 and 5-56
5-59 and 5-60	5-59 and 5-59.1
6-11 and 6-12	5-59.2 and 5-60
6-19 and 6-19.1	6-11 and 6-12
6-35 and 6-36	6-19 and 6-19.1
6-39 and 6-40	6-35 and 6-36
6-41 and 6-42	6-39 and 6-40
7-29 and 7-29.1	6-41 and 6-42
7-47 and 7-48	7-29 and 7-29.1
7-55 and 7-56	7-47 and 7-48
7-57 and 7-58	7-48.1 and 7-48.2
8-37 and 8-38	7-55 and 7-56
8-45 and 8-46	7-57 and 7-58
8-49 and 8-49.1	8-37 and 8-37.1
8-49.2 and 8-50	8-37.2 and 8-38

CCTC Ltr, C751, Change 5 to Computer System Manual CSM UM 246-82, Generalized Monitoring Facility, 1 April 1983

8-51 and 8-52	8-45 and 8-46
9-1 and 9-2	8-49 and 8-50
9-11 and 9-12	8-51 and 8-52
9-13 and 9-14	9-1 and 9-2
9-17 and 9-18	9-11 and 9-12
9-29 and 9-29.1	9-13 and 9-14
9-29.2 and 9-30	9-17 and 9-18
9-30.1 and 9-30.2	9-29 and 9-29.1
9-30.3 and 9-30.4	9-29.2 and 9-30
9-35 and 9-36	9-30.1 and 9-30.2
9-36.1 and 9-36.2	9-30.3 and 9-30.4
10-31 and 10-32	9-35 and 9-36
11-5 and 11-6	9-36.1 and 9-36.2
11-13 and 11-14	10-31 and 10-32
11-15 and 11-16	11-5 and 11-6
11-17 and 11-17.1	11-13 and 11-14
11-17.2 and 11-18	11-15 and 11-16
11-19 and 11-20	11-17 and 11-17.1
	11-17.2 and 11-18
	11-19 and 11-20

2. The effective date of these change pages is 1 April 1983.

3. When this change has been made, post an entry in the Record of Changes and file this letter before the title page.

FOR THE DIRECTOR:

78 Enclosures

SAMUEL D. PUCCIARELLI
Assistant Deputy Director
for Computer Services

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ILLUSTRATIONS

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ABSTRACT

This Users Manual provides the information necessary for an individual to run all of the programs that are comprised in the Generalized Monitoring Facility (GMF). Program interrelationships are presented, as well as a general overview of the processing, input, and output procedures for each program. Formats and examples of user-controlled input data and sample program outputs are shown and explained. Additionally, the Job Control Language (JCL) deck setups necessary to run the programs are provided.

This manual supersedes Command and Control Technical Center CSM UM 246-81, 1 May 1981.

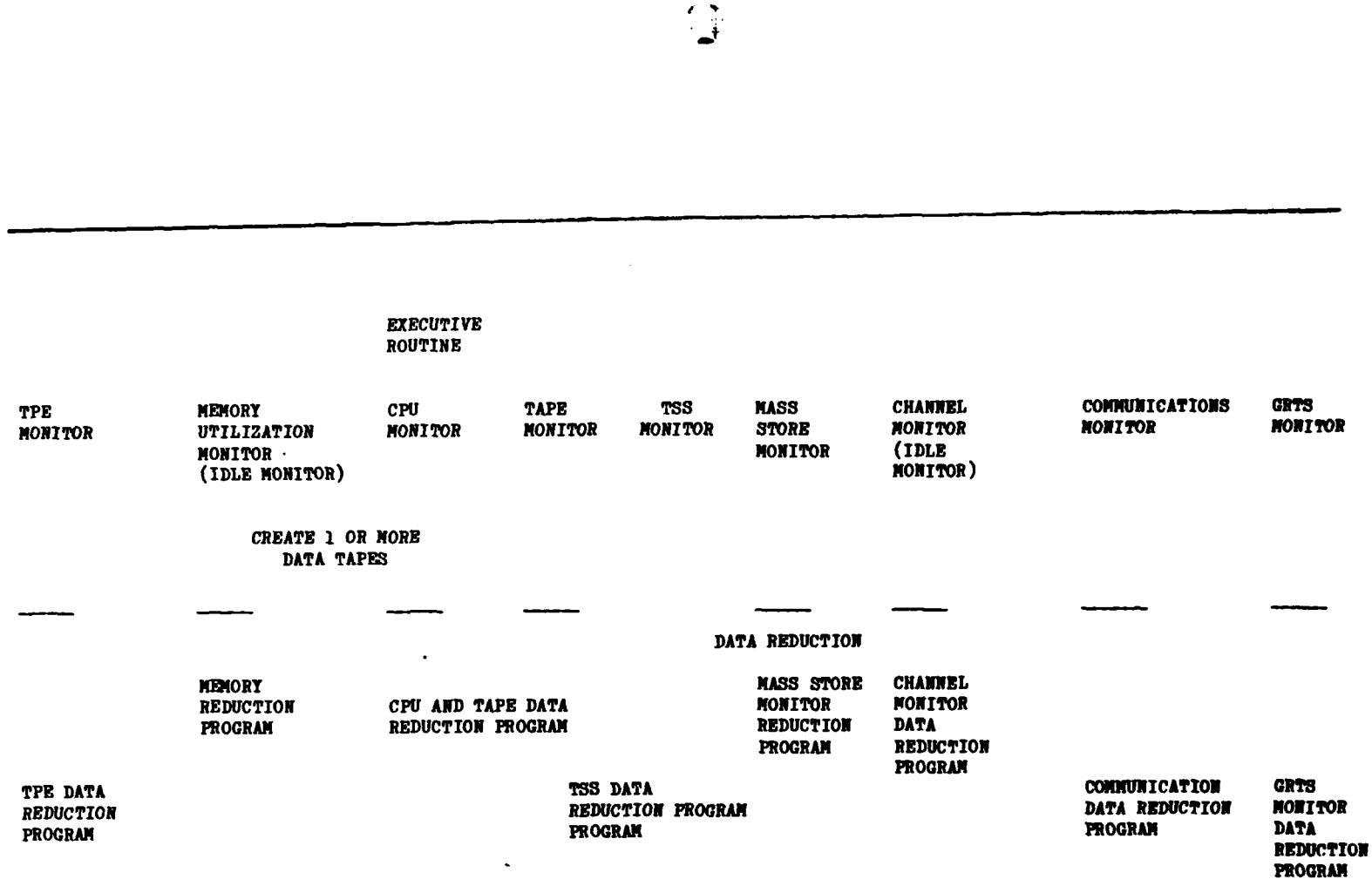

Figure 2-3. Programs in the GMC Subsystem

Data Collector Programs	Subroutines	Traces Captured (OCTAL) (NUMBER)
Memory Utilization Monitor	T10 T46	10,11,51 46
Idle Monitor	T21 TRCS	21 0,1,2,3,13,16,22, 37,65
Mass Store Monitor	T7	7,15,73*,76*,77*
Channel Monitor	T4,T7,T22	4,7,15,22
Tape Monitor	T50	50,51,52
CPU Monitor	T70	23*,51,63*,70*
Communications Analysis Monitor	T14	14*,15
GRTS Monitor	T62	62*
TPE Monitor	T200	0,1,2,4,5,6,13, 42,51,65,74*
TSS Monitor	T100	74*

* - Nonstandard traces generated by the particular monitor.

Figure 2-4. Subroutines and Traces in GMC Data Collector Programs

Table 2-1. GMC Release Dependent Parameters
(Part 1 of 6)

Program	LINE #	Variable	Explanation
GMF.TOP	100	SYS64	Used to control conditional assembly of GMC set=1 for W6.4(2H) release set=0 for W7.2(4J) release
	10240-10740	-	Code in this area searches for trace processing within the dispatcher. Trace code must be within 500 octal locations of the address specified by entry point 15 decimal of the dispatcher. This entry point should contain the address of location TRACE within the dispatcher, which is where the trace processing code is located. The code being searched for is an LDAQ;STAQ;TRAO,1. This patch will capture all traces executed by the system.
	10760-11180	-	Code in this area is used to make a correction to accounting processing, if the correction has not already been made via patches. The code is searched for within 500 octal locations of .MIOS entry point. The code searched for is SBLA TRREG+7,$;ARL 12; ADLA .CRTOD,7. The ARL is changed to an ARS.
CPU.PAT	260-440	-	Code in this area searches for an ASA .SALT,5 instruction in the dispatcher. Code must be within 300 octal locations after the address specified by entry point 20 decimal of the dispatcher. This entry point should contain the address of location DWAIT within the dispatcher. Ths trace indicates that a job is being taken out of processing.
	460-590	-	In a WW7.2 (4JS) system, code in this area searches for an STQ .QTOD,4 instruction. Search area is the same as described for line 240. This trace indicates that subdispatching has finished using the processor.
	620-780	-	If the dispatcher queue option of the CPU Monitor is activated, code in this area

Table 2-1. (Part 2 of 6)

Program	LINE #	Variable	Explanation
			searches for an ORSA .STATE,4 instruction followed by an LDA .STATE,4 instruction. Code must be within 100 octal locations after the address specified by entry point 7 of the dispatcher. This entry point should contain the address of location DSPQH within the dispatcher. This trace indicates that a job is being place into the dispatcher queue.
	790-950	-	If the dispatcher queue option of the CPU Monitor is activated, code in this area searches for a LCQ=010001,DL instruction followed by an ANQ .STATE,5 instruction. These instructions must be within 1500 octal locations after the address specified by entry point 1 of the dispatcher. This entry point should contain the address of location DSP within the dispatcher. This trace indicates that a job is being taken out of the dispatcher queue and placed into execution.
	970-1310	-	In order to implant its special hooks, the CPU Monitor must modify the dispatcher and, therefore, it requires eight words of patch space. If the dispatcher queue option of the CPU Monitor is activated, then 16 words, instead of the normal 8, are required. This patch area must be within 200 octal locations in front of the address specified by entry point 15 decimal of the dispatcher. This entry point should contain the address of location TRACF within the dispatcher.
	2190-2320	-	If sufficient patch space was not available in the standard patch area, tne CPU Monitor will attempt to locate patch space in a specially defined user patch area. This search will take place only if bit 2 of word 0 within the dispatcher is set. This patch space should be within 200 octal locations after the address

Table 2-1. (Part 3 of 6)

Program	LINE #	Variable	Explanation
			ILIST within the dispatcher. The address of ILIST is found in word 7 of the dispatcher.
	1950-2160	-	Code in this area searches for an ARL 12 instruction, followed by an ASA .CROVH,7 instruction in the .MFALT module. The search for this code begins at the address specified by entry point 13 decimal of .MFALT and continues until the code is located. This entry point should contain the address of location BOOT within .MFALT.
CAM.INIT	930-1070	-	Beginning at 1400 octal locations from the entry point of .MDNET and continuing for 5000 octal locations search for an ANA=0777777,DL (777777375207) instruction, followed by a CMPA (0000000115210) instruction. This searches for number of special interrupts processed code (NSIP).
	1190-1330	-	Beginning at the CMPA location found above in .MDNET and continuing for 3000 octal locations search for an ANA=077 followed by a CMPA=077. When found, back up 30 octal words and look for an AOS instruction. This searches for the # of lines waiting mailbox code (R01XCT). If this code is not found, then the search is repeated looking for ANQ and CMPQ instructions instead. These instructions must be in an inhibited mode. This second search is required due to a redesign of the DNET module under commercial release 4JS3, edit level 4.
CAM.PAT	170-290	-	Code in this area searches for an LDQ M.LID,3 instruction, followed by an ANQ=0077777,DU instruction in module DNWW/DNET. The search for this code begins at the address specified by entry point -8 of DNWW/DNET and continues until the code is located. This entry point should contain the address of location NRQWT-DNET within DNWW/DNET.

Table 2-1. (Part 4 of 6)

Program	LINE #	Variable	Explanation
	350-500 and 690-820	-	In order to implant its special hooks, the CAM must find 8 words of patch space. Even though the CAM is modifying module DNET, it will use the patch space available in the .MDISP module. This search for space is identical to that for CPU.PAT at lines 970-1310 and lines 2190-2320.
MSM.PAT	200-240	-	Code in this area searches the dispatcher for SSA cache code. If bit 4 of word 0 in the dispatcher is set, then cache is available. If this bit is not set, then no further searches are performed.
	250-380	-	Code in this area searches the dispatcher for the location of DBASE. The address at entry point -2 is obtained. This address points to the location ILIST in the dispatcher. At location ILIST, a series of addresses are stored and MSM.PAT searches this list for the address DBASE.
	410-640	-	Code in this area searches for an AOS .CRTDL and an AOS .CRTBH instruction. This code needs to be within 300 octal locations after the address DBASE within the dispatcher.
	670-790 and 1120-1250	-	In order to implant its special hooks, the MSM Monitor must modify the dispatcher and, therefore, it requires 8 words of patch space. This search is identical to that for CPU.PAT at line 680 and lines 970-1310 and 2190-2310.
GMF.MON	840	FMS1	Offset from entry point of .MFSIO which points to the word giving the absolute address of FMS catalog cache buffer. Used only in W7.2. Set to -13 decimal.
	850	FMS2	Offset from entry point of .MFSIO pointing to the word which gives the option selection for FMS catalog cache. Used only in W7.2. Set to -15 decimal.

Table 2-1. (Part 5 of 6)

Program	LINE #	Variable	Explanation
MUM.T10	220	SYS64	See GMF.TOP
	920	FIFO	Address of the FIFO buffer within PALC. It is used to search the JCT table of PALC. This includes adding in a 110 octal offset for the loading of PALC in W6.4. There is no PALC offset in W7.2.
	5400	XPQ24	Location in CALC of the memory demand table. Set to octal 111.
	5410	SLVSNB	Offset in slave prefix area of job SNUMB. Set to octal 36.
	5420	MEMUSE	Offset in slave prefix area of loader memory use word. Set to octal 37.
	5430	IDENT	Offset in slave prefix area of job IDENT. Set to octal 66.
CM.T07A	190	IDENT	Offset in slave prefix area of job ident. Set to octal 66.
	210	SYS64	See GMF.TOP
	9960-10130	-	Code in this area searches .MFSIO in order to gather statistics for FMS catalog cache analysis. All the following references are offsets from the entry point of .MFSIO: -12 # of cache hits -11 # of writes -10 # of reads 841 # of reads not in CC 842 # of 320-word reads 843 # of skips 844 # of cache clears 848 # of no hits 849 # of hits
	10180-10250	-	Code in this area searches .MASO4 in order to gather statistics concerning the available space table utilization. All the following references are offsets from the entry point of .MASO4:

Table 2-1. (Part 6 of 6)

Program	LINE #	Variable	Explanation
			-6 # of times buffer allocation attempted -5 # of times buffer busy -4 # of times AST was in memory -3 # of times AST in memory but busy
	11450	FFCCC	Address in PALC where the file code is stored during GEFSYE processing. Set to 6177 octal in W6.4 and 13143 octal in W7.2. This includes 110 octal for loading of PALC in W6.4. There is no offset for PALC in WW7.2.
	11460	SNUMBP	Address in PALC where the SNUMB is stored during GEFSYE processing. Set to 35012 octal in W6.4 and 2632 octal W7.2. This includes 110 octal for loading of PALC in W6.4. There is no offset for PALC in WW7.2.
	11470	ACT	Address in PALC where the activity number is stored during GEFSYE processing. Set to 33231 octal in W6.4 and 1051 octal in W7.2. This includes 110 octal for loading of PALC in W6.4. There is no offset for PALC in W7.2.

4.1.2.3 Intermediate Record - Current File (File DR). This file contains the intermediate records created during the current execution of the program. This file is used to pass the intermediate records to the daily monitor (DEMON), when present, in a subsequent activity.

4.1.3 PSUMR Deck Setup. The following control cards are required to execute PSUMR:

```
$    IDENT      ACCOUNTING INFORMATION
$    USERID     USERID$PASSWORD/SCC
$    PROGRAM    PSUMR,Dump
$    LIMITS     20,20K,,5K
$    PRMFL      **,R,R,B29IDPXO/NEWRMON/DDYN
$    DATA       PF            optional parameters
$    TAPE       OM            optional old master intermediate
                                record
$    TAPE       NM            new master intermediate record
$    FILE       DR            current file output
$    SYSOUT     RP            parameter file listing
$    TAPE       IN            SCF input file
$    FILE       S1,S1R,50R    sort files
$    FILE       S2,S2R,50R
$    FILE       S3,S3R,50R
$    FILE       S4,S4R,50R
$    ENDJOB
```

The sort files' size should be increased or decreased depending upon the input volume. Tape files may be replaced by permanent or temporary disk files. File DR may be null if the daily monitor does not follow in a subsequent activity.

4.2 DEMON

The daily monitor accepts the intermediate records created by PSUMR. A history file will be initialized (if current null) or updated from the data in the intermediate record. A matrix structure is built to summarize and store the data. The matrix contains 96 entries corresponding to the time period to be summed together. The entry size is variable depending upon the graphs to be produced. For DEMON, the default is all graphs. The history file contains a copy of this matrix structure. For an update run, DEMON copies the history file into core. A second matrix is built for the current day's data. Both matrices are then updated from the input. The history matrix is written to disk. Finally, the current input matrix is compared to the history matrix. If 25% of all data items are not within 25% of the history matrix value, the program generates a complete set of graphs to indicate a significant change from the history file value.

4.2.1 DEMON Inputs. DEMON has one required input and two optional inputs.

4.2.1.1 History File (File HF). The history file is required for DEMON execution. The history file is a random file which contains an image of the in-core matrix used for summarizing and comparing data.

4.2.1.2 Parameter File (File PF). The parameter file is optional. However, if PSUMR was supplied with a SUMMARY statement, the DEMON should be supplied the same summary statement for desired results. DEMON processes only a summary statement. The format and use of the parameter language statements is found in section 4.4.

4.2.1.3 Intermediate Records (File IN). This is an optional input. If present, the intermediate record data will be summarized, as described above, according to parameter setting marked on the intermediate record. The history file will be initialized or updated as it is appropriate. If file IN is not present, the history file data will be used to generate a set of graphs. This feature allows the user to get a current historical "picture" at any time.

4.2.2 DEMON Outputs. DEMON outputs are the updated history file and a listing file.

4.2.2.1 Updated History File (File HF). Refer to section 4.2.1.3.

4.2.2.2 Listing File (File RP). The output listing will contain a listing of the parameter file, if any, and any generated graphs. The graphs produced are listed and described in section 4.5..

4.2.3 DEMON Deck Setup. The following control cards are required to execute DEMON.

```
$    IDENT       ACCOUNTING INFORMATION
$    USERID      USERID$PASSWORD
$    PROGRAM     DEMON,DUMP
$    LIMITS      10,24K,,10K
$    PRMFL       **,R,R,B29IDPXO/NEWRMON/DDYN
$    DATA        PF       optional parameter file
$    TAPE        IN       optional intermediate file
$    PRMFL       HF,W,R, (history cat/file)
$    SYSOUT      RP
$    ENDJOB
```

File IN may be a permanent or temporary disk file. File HF is 24 random LLINKS.

4.3 RPTSUM

PSUMR has the ability to maintain a master file of intermediate records. RPTSUM will process this file to produce any number of reports. Each report

9 REMOTE STATUS

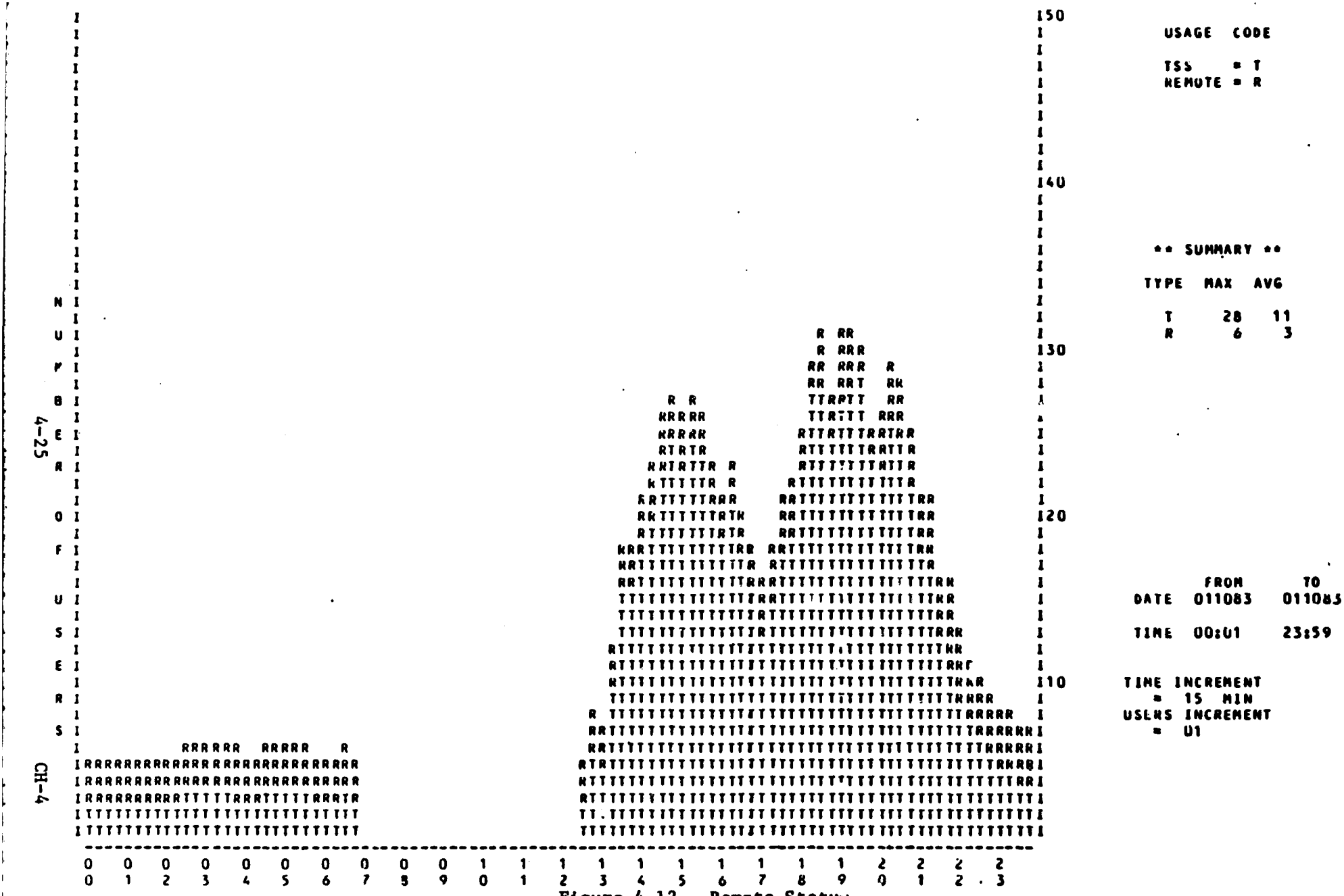

Figure 4-12. Remote Status

4.6 Usage Concepts

The WWMCCS resource monitor is designed to provide a means of tracking the utilization of major system components over extended time periods and to daily monitor the system usage automatically. By using the data supplied from the graphs, a PLOT of the system utilization can be developed. Such a plot would provide useful trending information. The daily monitoring capability provides a means of determining when utilization has varied from the established norm.

To use the resource monitor as designed, the following steps are required:

1. Turn on collection of SCF 608 records (refer to section 3).

2. Run the collector while the system is operational.

3. At the end of the system clock day (2400Z for WWMCCS sites), close the SCF file.

4. Run a PSUMR/DEMON job to create intermediate records and update the history file. The input is the day's SCFCLO tapes (or a daily tape made from the SCFCLO tapes). The intermediate records should be accumulated on a disk file if a weekly report or trending analysis will be done. The parameters of the history file should be set for prime time. This is accomplished by having the PSUMR/DEMON parameter file contain the following SUMMARY statement:

```
SUMMARY
      SUM     1300 2100
      NOSUM   011083/5/2
```

   Washington is ZULU +5 so prime time is 0800 + 5 = 1300. Hawaii is +10; hence, prime time begins at 1800. The NOSUM statement will exclude weekend data from the history file.

5. Daily Monitoring - Once the history file is initialzed, the graphs will not be generated unless the current day's data differs from the history file data by 25 percent for 25 percent of the data items. When the graphs are generated, it is an "automatic" signal that this day's utilization varied from the norm. The current status of the history file can be obtained (i.e., a set of graphs generated) by running DEMON and omitting file code for input.

6. Trending Analysis - In order to detect trends (increases or decreases) in utilization, the analyst must develop a plot of the values he wishes to "track." Until more experience is gained with the system, we recommend a weekly plot because a daily plot will probably have to much variance, while monthly might not be sufficient to detect trends. The weekly figures to plot are

obtained by generating desired graphs using RPTSUM and the saved intermediated record file. For example: suppose the site wishes to track TSS processor utilization and the number of TSS users during prime and non-prime time. This would be accomplished by running RPTSUM with the following parameters (assume +5 for time):

```
REPORT

     NAME PRIME
     SYSTEM NMCC
     TIME   1300 2100
     INCLUDE GRAPH 1,8

REPORT

     NAME NPRIME
     SYSTEM NMCC
     TIME   2101 1259
     INCLUDE GRAPH 1,8
```

These parameters will generate two processor utilization graphs and two remote status graphs: one for prime and one for non-prime time. Using graph paper, record the average (or maximum) TSS processor value and number of TSS users (see figure 4-13). If a site is currently experiencing a change in utilization, several weeks' data should show a trend (increase/decrease).

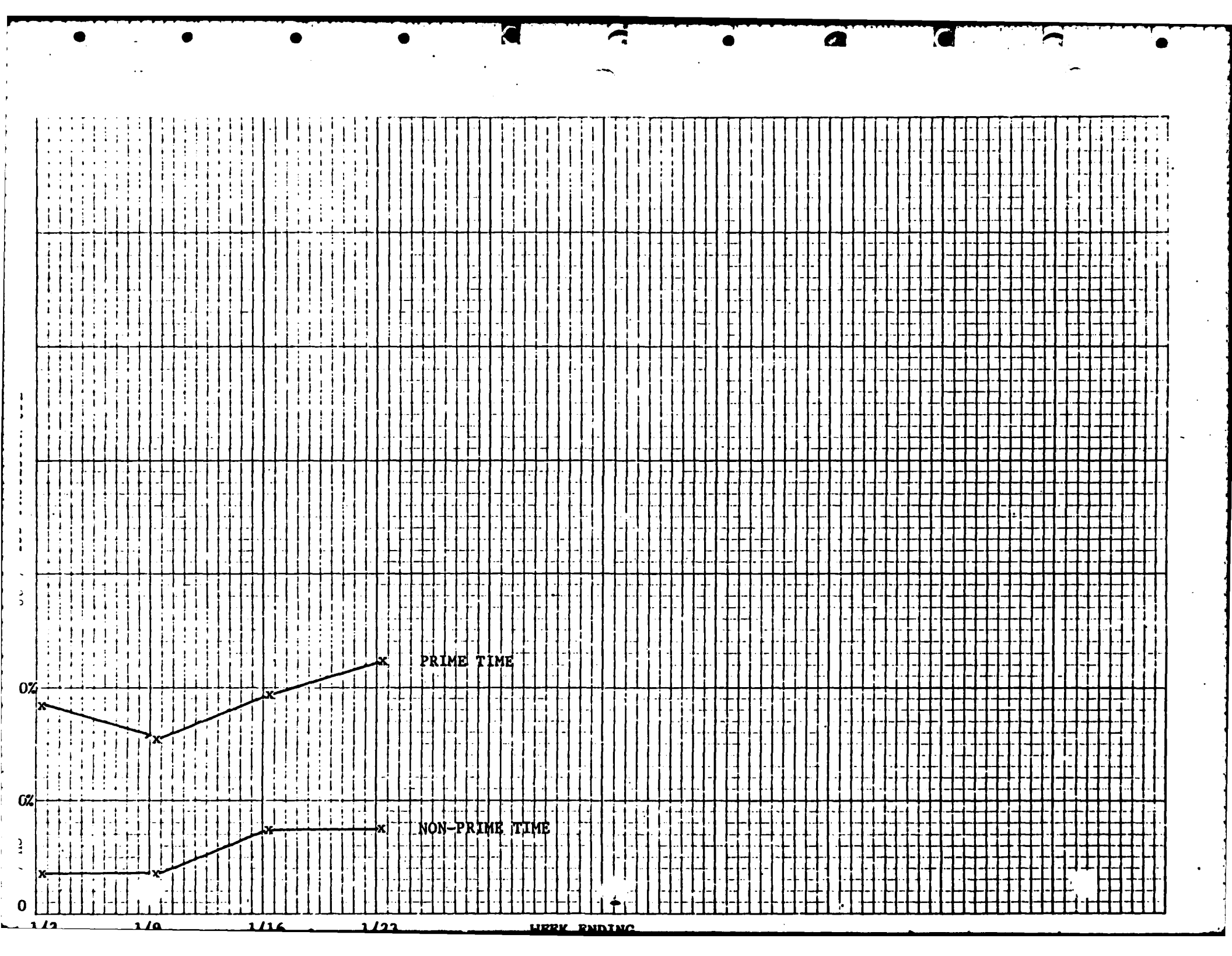
PRIME TIME
NON-PRIME TIME
0%
0%
0
1/2
1/9
1/16
1/22
WEEK ENDING

Table 5-1. Required Trace Type for Each Monitor

Monitor #	Monitor	Required Trace Type (Octal)
0	Memory Utilization Monitor (MUM)	10, 11, 46, 51, (Idle Monitor traces optional)
1	Mass Storage Monitor (MSM)	7, 15, 73*, 76*
2	CPU Monitor (CPUM)	23*,51,63*,70*
3	Tape Monitor (TM)	50, 51, 52
4	Channel Monitor (CM)	4, 7, 15, 22 (Idle Monitor traces optional)
5	Communications Analysis Monitor (CAM)	14*, 15
6	GRTS Monitor (GRTM)	62*
7	Transaction Proc-essing System Monitor (TPSM)	0, 1, 2, 4, 5, 6, 13, 42, 51, 65, 74*
8	Idle Monitor (IDLEM)	0, 1, 2, 3, 13, 16, 21, 22, 37, 65
A	TSS Monitor (TSSM)	74*

*These are not standard traces. They are specially created by the GMC or by an editing of the GCOS TPE Subsystem in the case of trace type 74. Trace types 23, 63, 70, 73 and 76 are direct transfers into the GMC and as such are not required to be active via the $ TRACE card in the system boot deck. Trace types 14, 62 and 74 do use the System Trace Function and require the Trace Number to be active on the $ TRACE card.

Table 5-2. Abort Codes (Part 1 of 4)

B2 - Illegal SNUMB on MSM data card (more than 5 characters).

B3 - More than 5 SNUMBs for MSM SNUMB option.

BC - Illegal request on limited connect option.

BK - Backspace of the full data tape was bad. Multireel will not be collected. Check for tape drive problems.

BS - Bad tape status. Check condition of tape and rerun job.

C1 - CPU Monitor turned off but SNUMB input requested on the data card.

C2 - Illegal SNUMB (more then five characters) on data card for CPU SNUMB option.

C3 - More then three SNUMBs for CPU Monitor on data card.

CD - Illegal character in CAM special option.

CE - Console message garbled. Check console sheet and check with operator.

CM - Cannot move out of the growth range of TSS.

CO - CAM turned off but special option requested.

DK - No multireel disk file was present. Use a $ FILE card in the JCL or use the M9 option to turn off multireel capability.

DR - Disk read-in. End-of-reel processing was bad.

DS - Bad status of the disk write.

ER - Wrapup record could not be written.

ET - More than two terminals requested for CAM special option.

FN - The IOS accounting modification could not be found. Call CCTC.

GC - No GRTS control card.

GD - No FEP I/O can be performed.

GM - Needed memory for GRTS Monitor denied. Increase $LIMIT card.

GO - GRTS Monitor illegal data card.

GS - Extra SSA is not available for GRTS Monitor. Check $ LIMIT card.

Table 5-2. (Part 2 of 4)

M0-M8,MA - Monitor was not turned off and not present on the R* file. Any monitor not contained on the R* file must be turned off via the data card option. The number following the M is the monitor that was not turned off.

MM - The dispatcher hook has already been inserted. Another version of GMC must already be in execution.

N1 - The CPU Monitor hook code could not be found. See subsection 5.2.3.

N2 - Sufficient patch space is not available in .MDISP to run the CPU Monitor. See subsection 5.2.3.

N3 - DNWW/MDNET patch location could not be found. See subsection 5.2.6.

N4 - Sufficient patch space is not available in DNWW/MDNET to run the Communications Analysis Monitor. See subsection 5.2.6.

N5 - MSM patch for SSA cache analysis not found (AOS .CRTDL). See subsection 5.2.2.

N6 - MSM patch for SSA cache analysis not found (AOS .CRTBH). See subsection 5.2.2.

N7 - MSM patch space in .MDISP not sufficient for monitoring SSA cache. See subsection 5.2.2.

N8 - CPU Monitor hook code for subdispatch could not be found. See subsection 5.2.3.

NA - CPU Monitor hook code for dispatcher queuing could not be found. See subsection 5.2.3.

NB - CPU Monitor hook code for removing jobs from dispatcher queue could not be found. See subsection 5.2.3.

NF - The Dispatcher hook code could not be found. Call CCTC/C751.

NS - A CAM abort because it could not find NSIP (# of special interrupts) address in .MDNET.

NR - A CAM abort because it could not find R01XCT (number of lines found waiting mailbox) instruction.

OE - An error in an off option was encountered. Check the data cards. There is either an illegal character on the data card or a monitor which was not compiled in the R* file (see assembly listing) has not been turned off.

Table 5-2. (Part 3 of 4)

OK - All went correctly.

OL - Overlap of disk file. Increase size of disk file. Check if operator failed to respond to tape mount message during multiprocessing.

OV - A tally overflow occurred in the MUM.T10 subroutine. Increase the size of the data area within subroutine MUM.T10, variable SIZBUF. If this action is required, the user must insure that the variable CRSIZE is changed via a global edit in all data reduction routines. The new value of CRSIZE should equal the new value of SIZBUF +50.

RS - Routine depth requested exceeded table length.

RW - Error in initial rewind. Check tape and drive.

SB - End-of-reel processing was bad. Check tape and drive.

SD - Error setting of density.

SF - Limited reel option termed successfully.

SQ - Sequence error in the physical records.

S1 - Subroutine MUM.T10 missing

S2 - Subroutine MUM.T46 missing

S3 - Subroutine CM.T07A missing

S4 - Subroutine CPU.T70 missing

S5 - Subroutine CM.T04A missing

S6 - Subroutine CM.T22A missing

S7 - Subroutine TM.T50 missing

S8 - Subroutine CAM.T14 missing

S9 - Subroutine GRT.T62 missing

SA - Subroutine IDL.TRCS missing

SC - Subroutine IDL.T21 missing

SD - Subroutine TPE200 missing

SG - Subroutine TSS.COL missing

Table 5-3. (Part 2 of 4)

SEGMENT #	FILE	REQUIRED	FUNCTION
19	GMF.MON	Y	Insert the trace hook for GMC traces
20	CPU.REMO		Remove CPU Patches to dispatcher
21	CAM.REMO		Remove CAM patches to DNWW/MDNET
22	MSM.REMO		Remove MSM patches to dispatcher
23	GMF.BTM	Y	Remove the trace hook, do all IO control
24	IDL.TRCS		Processes traces (octal) 0,1,2,3,13,16,22,37,65 for Idle Monitor
25	IDL.T21		Processes trace (octal) 21 for Idle Monitor
26	MUM.T10		Processes traces (octal) 10,11,51 for Memory Monitor
27	MUM.T46		Processes trace (octal) 46 for Memory Monitor
28	CPU.T70		Processes traces (octal) 23,51,63,70 for CPU Monitor**
29	TM.T50		Processes traces (octal) 50,51,52 for Tape Monitor
30	CAM.T14		Processes traces (octal) 14 and 15 for CAM*
31	CM.T04A		Processes trace (octal) 4 for Channel Monitor
32	CM.T22A		Processes trace (octal) 22 for Channel Monitor
33	CM.T07A		Processes traces (octal) 7,15,73,76 for Channel Monitor and Mass Store Monitor**

Table 5-3. (Part 3 of 4)

SEGMENT #	FILE	REQUIRED	FUNCTION
34	GRT.T62		Processes trace (octal) 62 for GRTS Monitor*
35	GRT.COL		Interfaces with the DN-355
36	TPE200		Processes traces (octal) 0,1,2,4,5,6,13,42,51,65 and 74 for TPE Monitor*
36A	TSS.COL		Captures trace (octal) 74 for TSS Monitor*
37	RUN.GMF		JCL to run a GMC R *
38	GMF.OBJ		File to contain a GMC R *
	The following set of files are a series of JCL files under the catalog B29IDPXO/GMFCOL/MAKE used to create different GMF R* monitors. The numbers in the name are the corresponding monitor number (see subsection 5.5.1):		
39A	MO2		Memory and CPU Monitors
39B	ALL		Total GMC
39C	MUM		Memory Monitor
39D	CPU		CPU Monitor
39E	TM		Tape Monitor
39F	MSM		Mass Store Monitor
39G	MO258		Memory, CPU, Communications and Idle Monitors
39H	M148		Mass Store, Channel and Idle Monitors
39I	CAM		Communications Analysis Monitor
39J	CM		Channel Monitor
39K	GRT		DATANET-355 Monitor

Table 5-3. (Part 4 of 4)

SEGMENT #	FILE	REQUIRED	FUNCTION
39L	M48		Channel and Idle Monitors
39M	M14		Mass Store and Channel Monitors
39N	M56		Communications and DATANET Monitors
39O	TPE		TPE Monitor
39P	TSS		TSS Monitor
39Q	MO25		Memory, CPU and Communications Monitors
39R	MO1245		Memory, Mass Store, CPU, Channel and Communications Monitors

*Trace types 14,62 and 74, are not standard. They are internally generated (IT) traces.

**Trace types 23,63,70,73 and 76 are not standard. They are direct transfer (DT) traces.

information from the Peripheral Allocator is reported only when the Peripheral Allocator is in memory and a Memory Monitor trace is about to be generated. For this reason, not all Peripheral Allocator queue changes will be reported. In order to reduce the amount of information being collected, a job's status in the Peripheral Allocator's queue is reported only for new jobs, when a job has changed activity, or when its status has changed.

After reporting any Peripheral Allocator status information, the MUM will next report the status of every job waiting for or currently using memory. Information such as the SNUMB, IDENT, USERID, Activity Number, memory demands, current memory address, whether the job is in memory or waiting for memory, and whether the job is a system program or user program is collected. This information is reported for each job only if a change has occurred from previous information that was reported. In addition, the current amount of CPU and IO time used by a job is reported in every MUM trace that is generated.

The MUM will consider a job to be a system job if it has a program number less then octal 10, or if it has no J* file and requires privity. Since the user may want to consider other jobs to be system jobs, such as HEALS or VIDEO, the data reduction program allows the user to extend this definition of system jobs (see section 6).

5.2.2 Mass Storage Monitor. The Mass Storage Monitor (MSM) is used to collect data on usage of peripheral resources. For a detailed description of reports containing data collected by this monitor, see section 7.

When the user wants MSM to be active, it is essential that trace types (octal) 7 and 15 are enabled in the computer system boot deck on the $ TRACE card. MSM processes trace types 7, 15, 73, and 76 to build its own records which are passed to ER. A separate discussion of the format of the MSM collected data records is contained in subsection 5.4.3. As has been stated earlier, trace types 73 and 76 are direct transfer traces created by the GMC, and as such need not be defined on the $ TRACE card. The MSM requires that at least the following segment numbers from table 5-3 be used to generate the GMC R* file: 1, 3, 11, 14, 15, 18, 19, 22, 23, and 33. The complete process for generating an R* file is described in subsection 5.6. If the system being monitored by the Mass Store Monitor contains SSA Cache Core, two new direct transfer traces, are created by the Mass Store Monitor in order to collect sufficient data to be able to analyze the operation of SSA Cache Core. These traces are created only if SSA Cache Core is configured. The Mass Store Monitor searches the dispatcher for a AOS .CRTDL instruction and then inserts code to make a direct transfer into the GMF. In addition, an AOS .CRTBH instruction is also searched for so that another direct transfer into the GMC can be generated. The first instruction locates the area of the dispatcher where it has been determined that the required SSA module is not in the SSA Cache Buffer and needs to be loaded from disk. The second instruction

locates that area of the dispatcher where it has been determined that he required SSA module is in the SSA Cache Buffer. Section 2.6.2 (MSM.PAT) completely describes the procedure for locating these instructions. If GMC cannot find these instructions between these locations, it will abort with an N5 or an N6 abort. If this problem occurs, the dispatcher code should be examined to see if this instruction has been moved or modified. If so, the code in GMC will need to be altered.

Upon finding the above sets of instructions, GMC searches the dispatcher area for 8 free locations in which to create two new direct transfer traces. Section 2.6.2 (MSM.PAT) completely describes the procedure for locating the patch area. If 8 words of free space are not found, an N7 abort will occur. In this case, the user should examine the patch deck and a listing of the patches on the total edit tape to see if a large number of patches have been made to the dispatcher. If this is the case, the dispatcher code will need to be reassembled in order to remove these patches or else the Monitor will not be able to be utilized. The user does have another alternative. This alternative involves patching word 0 of the dispatcher in order to generate a user patch area. The patch involves the setting of bit 2 to a 1 in word 0 of the dispatcher. No other modification by the user is necessary.

The MSM collects sufficient information so as to be able to completely monitor the usage of the entire disk subsystem, the usage of SSA Cache core and the usage of FMS catalog cache, when active. When either the MSM or CM is active, a record containing device names and addresses is written at the beginning of the GMC run and periodically afterward if device names change. This is done only for mass store devices. Every time the system issues a connect request to a tape drive or disk drive, sufficient information is collected so as to be able to identify who is issuing the connect, the file being connected to, the pack upon which the file is located, the parameter types for the file being connected to and the reason for the connect, i.e read, write, write verify, etc.

Whenever a MME is issued the MSM will check whether it is a system job issuing a MME GEFSYE. For purposes of this check a system job is considered to be any job with a program number less then octal 15. If the Peripheral Allocator is issuing the GEFSYE, information is collected as to the SNUMB the Peripheral Allocator is working for, and the file code that is being GEFSYE'd. If the GEFSYE type is a 2, 3, 4, 5, 8, 9, 10, 11, 18, 19, 20, 22, 23, 27, 28, or a 29 then additional information is collected so as to be able to determine the CAT/FILE string of the file being GEFSYE'd. This information will be used by the data reduction program to correlate file codes used by jobs to the actual CAT/FILE string being referenced by a job. Also, sufficient information is collected so as to be able to report how

many FILSYS connects are required in order for the system to be able to allocate and deallocate files requested by a job.

If FMS catalog cache is active or available space tables are being buffered in memory then the MSM will generate a record type octal 77 with sufficient data as to be able to monitor the effect of FMS catalog cache and available space table buffering. This record is generated once, for every 5000 connects issued by the system. This is not a physical trace that is being generated and, as such, does not need to be present on the $ TRACE card. Rather, it is merely a data record that is being written to tape and given the unique number of octal 77. The data record consists of a dump of some internal performance parameters maintained by the GCOS system within modules .MFSIO and .MASO4.

5.2.3 CPU Monitor. The CPU Monitor (CPUM) is used to collect data on CPU utilization. This monitor can be used only on a WW7.2 or commercial 4JS system. For a detailed description of reports containing data collected by this monitor, see section 11. When the user desires that the CPUM be active, GCOS trace type (octal) 51 must be enabled in the computer system boot deck on the $ TRACE card. CPUM processes trace types 51, 23, 63 and 70 to build its records which are passed to ER. A separate discussion of the format of the CPUM collected data records is contained in subsection 5.4.4. Trace types 23, 63 and 70 are direct transfer traces, created by the GMC, and as such, need not be defined on the $ TRACE card. The CPUM requires that at least the following segment numbers from table 5-3 be used to generate the GMC R* file: 1, 4, 11, 13, 15, 16, 19, 20, 23, and 28. The complete process for generating an R* file is described in subsection 5.6. The CPU Monitor searches the dispatcher for an ASA .SALT,5 instruction and then inserts code to generate a direct transfer trace into GMC. In order to capture subdispatch processor time, it also searches for a STQ .QTOD,4 instruction and then inserts code to make a direct transfer into GMC. In the T70 capture routine, the time increment will be negative for a regular dispatch and positive for a subdispatch. In order to monitor dispatcher queuing, the CPU Monitor will search the dispatcher for an LDA .STATE,4 instruction and then insert code to generate a direct transfer trace into GMC. Finally, in order to monitor the removal of jobs from the dispatcher queue, the monitor will search the dispatcher for an ANQ .STATE,5 instruction and then insert code to generate a direct transfer trace into GMC. Section 2.6.2 (CPU.PAT) completely describes the procedure for locating these groups of instructions.

If GMC cannot find the ASA .SALT,5 instruction, it will abort with an N1 abort; if it cannot find the STQ instruction it will abort with an N8 abort; if it cannot find the LDA instruction, it will abort with an NA abort; and if it cannot find the ANQ instruction, it will abort with an NB abort. If these aborts occur, the dispatcher code should be examined to determine if the instruction has been modified, moved, or patched. If so, the code in GMC will need to be modified.

Upon finding these instructions, GMC searches the dispatcher patch area(s) for either 8 or 16 free locations in which to create a direct transfer trace into the GMC. Section 2.6.2 (CPU.PAT) completely describes the procedure for locating the patch area. If patch space is not found, an N2 abort will occur. See subsection 5.2.2 for a description of an alternate procedure in case the search for patch space fails.

The CPU Monitor tracks the CPU usage of all system programs and accumulates CPU usage of slave jobs into a single value (see subsection 5.4.4). If the user desires, he can specify up to five slave jobs for which he wants the CPU monitor to track CPU usage, just as it does for system jobs. Subsection 5.5.5. describes this user option.

The CPU Monitor can be operated in one of two modes. Under the standard default mode, the monitor will capture data for reporting on CPU utilization, as well as CPU dispatcher queuing. The user should refer to subsection 5.4.4 for a description of the data collected and section 11 for a description of the reports produced by this monitor. Under this mode of operation, the monitor will use approximately 3-4% of the available processor power. The user has the option of disabling the CPU dispatcher queuing portion of the monitor. Under this mode of operation, the monitor will only require about 1% of the available processor power, but the user will receive no reports concerning dispatcher queuing, lengths of queues or amount of time in queue. See subsection 5.5.5 for a description of this user option.

5.2.4 Tape Monitor. The Tape Monitor (TM) is used to collect utilization statistics on magnetic tape drive activity. A separate discussion of the format of the TM collected data records is contained in subsection 5.4.5. Reports containing data collected by this monitor are described in section 11.

When the user desires that the TM be active, GCOS trace types (octal) 50, 51, and 52 should be enabled in the computer system boot deck on the $ TRACE card. TM processes these trace types to build its records which are passed to the ER. The TM requires that at least the following segment numbers from table 5-3 be used to generate the GMC R* file: 1, 7, 11, 19, 23, and 29. The complete process for generating an R* file is described in subsection 5.6.

5.2.5 Channel Monitor. The Channel Monitor (CM) is used to measure I/O channel activity over tape and disk channels and contention to disk devices. A separate discussion of the format of the CM collected data records is contained in subsection 5.4.6. See section 8 for a description of reports containing data collected by this monitor.

When CM is active, it is essential that GCOS trace types (octal) 4, 7, 15, and 22 are enabled in the computer system boot deck on the $ TRACE card. CM processes these trace types to build its records,

which are passed to the ER. The CM requires that at least the following segment numbers from table 5-3 be used to generate the GMC R* file : 1, 6, 11, 19, 23, 31, 32, and 33. The complete process for generating an R* file is described in subsection 5.6.

Actually, when the CM is active, sufficient data is processed for obtaining reports not only from the Channel Monitor but also from the Mass Store Monitor. The only Mass Store Monitor data that cannot be collected would be the data needed to analyze Cache Memory. If the user also wants this data to be collected, he should create an R* file from the following segments (see table 5-3): 1, 3, 6, 11, 14, 15, 18, 19, 22, 23, 31, 32, and 33. In addition, the Mass Store Monitor must be made active. There is an additional option available with the Channel Monitor. This option allows the Channel Monitor Data Reduction Program to produce a CPU Idle/IO Active Report. This report is described in section 8. To obtain this report, the Idle Monitor must be included in the R* file. In addition, all Idle Monitor traces must be active. The following segments are required to generate the R* file: 1, 6, 10, 11, 19, 23, 24, 25, 31, 32, and 33.

5.2.6 Communications Analysis Monitor. The Communications Analysis Monitor (CAM) is used to measure machine and user response time and terminal usage. A separate discussion of the format of the CAM collected data records is contained in subsection 5.4.7. The complete process for generating an R* file is described in subsection 5.6. The output reports, containing data collected by CAM, are described in section 9. When CAM is active, it is essential that the GMC generated trace type (octal) 14 and the GCOS trace type (octal) 15 are enabled in the computer system boot deck on the $ TRACE card. CAM patches the DNWW (MDNET in W7.2) module, looking for a LDQ M.LID,3 instruction followed by an ANQ =0077777,DU instruction. When the monitor is terminated, CAM removes these patches from the system. The CAM requires that at least the following segment numbers from table 5-3 be used to generate the GMC R* file: 1, 5, 11, 12, 15, 17, 19, 21, 23, and 30.

The method used by the CAM to patch DNWW/MDNET is similar to that used by the CPUM to patch the dispatcher. Section 2.6.2 (CAM.PAT) completely describes the procedure for locating these instructions.

If CAM cannot find this instruction, GMC will abort with an N3 abort. If this problem occurs, the DNWW/MDNET code should be examined to see if this instruction has been moved or modified. If so, the code in CAM.PAT will need to be altered.

Upon finding this instruction, CAM then searches DNWW/MDNET patch area for 10 free locations in which to create a new system trace type 14. Section 2.6.2 (CAM.PAT) completely describes the procedure for locating this patch area. If no space is found by this search, an N4

4	0-35	Processor time (clock pulses) for program 2 ($PALC, Peripheral Allocator)
5	0-35	Processor time (clock pulses) for program 3 ($SYOT, SYSOUT writer)
6	0-35	Processor time (clock pulses) for program 4 ($RTIN, scheduler)
7	0-35	Processor time (clock pulses) for program 5 (TS1, TSS Executive)
8	0-35	Processor time (clock pulses) for program 6 ($TOLT, T&D executive; also includes time for special T&D SNUMBs)
9-16	0-35	Processor time (clock pulses) for programs 7-14 (decimal) (Transaction Processor, Log-on, FILSYS protection, WIN, DMTEX). In commercial releases, several of these words will contain no data since many of these programs are strictly WWMCCS related.
17	0-35	Processor time (clock pulses) for GMC
18	0-35	Processor time (clock pulses) for user programs
19	0-35	Subdispatch time (clock pulses) for program 5 (TS1)
20	0-35	Processor time (clock pulses) for TS2 executive
21	0-35	Processor time (clock pulses) for TS3 executive
22	0-35	Processor time (clock pulses) for TS4 executive
23	0-35	Subdispatch time (clock pulses) for TS2
24	0-35	Subdispatch time (clock pulses) for TS3
25	0-35	Subdispatch time (clock pulses) for TS4
26	0-35	Miscellaneous subdispatch time (clock pulses) (expansion capability for TDS, TPE II)
27-51	0-35	Number of dispatches to those programs associated with words 2-26
52	0-35	RSCR time
53-58	0-35	Idle time for processors 0-5 (.CRIDT)
59-64	0-35	Overhead time for processors 0-5 (.CROVH)
65-69	0-35	Processor time (clock pulses) for 5 specially requested SNUMBs
70-74	0-35	Name of special SNUMB in BCD
75-80	0-35	Gate loop time for each processor. Module .MFALT deducts gate loop time from the processor time charged to jobs and adds it to overhead time reported in .CROVH.

(If the user disables the monitoring of dispatcher queuing, this is the end of the CPU record. If dispatcher queuing is left enabled, then the record will contain the following additional data:)

81-144	0-35	The dispatcher queue table
145-169	0-35	Dispatcher queue time (microseconds) for those programs associated with words 2-26. It should be noted that words 162, 166-169 will contain no data since subdispatch queuing is currently not monitored.
170-174	0-35	Dispatcher queue time (microseconds) for 5 specially requested SNUMBs

5.4.4.2 Trace Type 63 - Initial. The CPU Monitor generates an initial record which describes the dispatcher options that are active.

Word	Bits	Information
1	0-17	Record size (8)
	18-26	Not used
	27-35	Octal 63 (trace number)
2-5	0-35	First four words of .MDISP
6	0-35	.CRPJT+2
7-9	0-35	Not used

5.4.4.3 Trace Type 63 - Activity Termination. Whenever an activity terminates, a record is generated describing the dispatcher queue time accumulated by the activity. This record is only generated when the dispatcher queuing option is left enabled.

Word	Bits	Information
1	0-17	Record size (9)
	18-26	Not used
	27-35	Octal 63 (trace number)
2	0-35	SNUMB
3	0-35	Queue time in microseconds
4	0-35	CPU time in clock pulses as determined by system
5	0-17	Program number
	18-35	Activity number
6	0-35	RSCR stop time of job
7	0-35	Start time of job taken from .CRTOD
8	0-35	Accumulated swap time of job in clock pulses
9	0-35	Stop time of job taken from .CRTOD
10	0-35	CPU time in microseconds as computed from traces

5.4.4.4 Trace Type 63 - Termination Record. When the GMF is terminated and the dispatcher queuing option is enabled, the following termination record is generated.

Word	Bits	Information
1	0-17	Record size (450)
	18-26	Not used
	27-35	Octal 63 (trace number)
2-65	0-35	Queue time for all currently active programs in microseconds
66-129	0-35	CPU time for all currently active programs in clock pulses as determined by system
130-193	0-35	SNUMB for all currently active programs
194-257	0-35	Start time for all currently active programs taken from .CRTOD
258-321	0-35	Activity number for all currently active programs
322-385	0-35	Cumulative swap time for all currently active programs in clock pulses
386-449	0-35	CPU time for all currently active programs in microseconds as determined from traces
386	0-35	RSCR clock time
387	0-35	.CRTOD clock time

5.4.5 TM. The Tape Monitor processes three GCOS system traces: 50, 51, and 52 and creates its own data collection records to evaluate the effect of these events.

5.4.5.1 Trace Type 50. This GCOS system trace is generated whenever an activity goes to the core allocator and will result in the generation of a GMC trace type 50 record. The format for this GMC trace type record is shown below.

Word	Bits	Information
1	0-17	Size of record (variable)
	18-26	Not used
	27-35	Octal 50 (trace number)
2	0-29	SNUMB
	30-35	Not used
3	0-35	Time stamp
4	0-11	Activity number
	12-17	Program number
	18-29	Urgency
	30-35	Octal 50
5-N	0-35	Words 1 and 2 of SCT entry for each tape used by this program

5.4.5.2 Special Trace Type 50. The first GMC trace type 50 record is a special trace 50 to indicate the status of all tape drives when the monitor first begins. Its structure is shown below.

Word	Bits	Information
1	0-17	Size of record (variable)
	18-26	Not used
	27-35	Octal 50 (trace number)

```
CC
1
M0 M3                    Turn off Monitor 0 and 3
M1                       Turn off Monitor 1
M1 M9                    Turn off Monitor 1 and collect only a single
                         reel
M1 *12.36,05.00          Turn off Monitor 1, start collecting data at
                         12.36, and collect for 5 hours
*,03.00                  All Monitors are present on the R* file and are
                         active, collection is to start at once and
                         continue for 3 hours
+CK                      All Monitors are present on the R* file, and
                         communication traffic is to be monitored for
                         terminal CK
M1 M4 M93                Turn off Monitors 1 and 4, and collect maximum
                         of three reels of data
M*                       Suppress abort if GMC cannot move
#VIDEO,HEALS             All Monitors are present on the R* file, and
                         accumulate processor time in the CPU Monitor
                         for these SNUMBs.
M0 M5 M8 ?1              Turn off monitors 0, 5, and 8.  Collect
                         only tape connects with the MSM and CM.
M0 M2 M5 X               Turn off monitors 0,2,5, read second data
MS2755T,RTOS             card, turn on MSM/CM special SNUMB option to
                         include TSS, FTS, $PALC, 2755T and RTOS.
M0 M4 MS                 Turn off monitors 0,4, and collect MSM/CM traces
                         for only TSS, FTS, $PALC.
```

Figure 5-2. Data Card Examples

(3) Requesting complete communication data for 1 or 2 terminal IDs.

(4) Suppressing a GMC abort if it cannot move to an acceptable location.

(5) Specifying up to three SNUMBS to be processed by the CPU Monitor.

(6) Requesting that only tape connects or mass storage connects be collected, but not both. The default is to collect both types.

(7) Declaring the start and stop times of monitoring.

(8) Special Debug Request.

(9) Specifying that the Mass Store Monitor and/or Channel Monitor are to collect data only for certain jobs.

(10) Specifying that the data card options are continuing on a new card. Without this option, only a single data card will be processed.

(11) Turn off the dispatcher queuing option for the CPU Monitor.

(12) Specifying the monitoring requirements for the GRTM.

All options are listed on a single data card, unless a dual data card is stated as being used. Each option should be separated from a previous option by the presence of a single blank column.

5.5.1 On/Off Option. This option allows the user to turn off all monitors not required for his purposes. Since the GMC default is to have all monitors turned on, unless specifically turned off, and since the TSS and TPE Monitors are incompatible, the user must have a data card and at least one of these two monitors must be turned off. The code format to turn off a given monitor is:

M0 = Memory Utilization
M1 = Mass Store Monitor
M2 = CPU Monitor
M3 = Tape Monitor
M4 = Channel Monitor
M5 = Communications Monitor
M6 = GRTS Monitor
M7 = TPE Monitor
M8 = Idle Monitor
MA = TSS Monitor
MB-MF = User Developed Monitors

Rules for this option are:

a. The time option must be the last parameter on the data parameter card as the card is read left to right and time is the last entry processed.

b. Asterisk signals GMC to process the time input option.

c. Use four characters for all times in each time entry field. Time is expressed as a 24-hour clock. All zero's must be present on the parameter card.

d. If the time option specifies a start at 0900 for a 4 hour run to 1300, and GMC is not spawned until 1000, the run will still terminate at 1300. In this case, only 3 hours of data will be collected, even though 4 hours of collection was specified.

e. The user can request the following: *22.00, 04.00. This means data collection should begin at 22:00 and continue until 02:00. The GMC will handle the problem of a clock rollover.

f. GMC allocates a tape drive as soon as it initially goes into execution. It keeps this tape drive even when it goes to sleep until told to start up. Therefore, if GMC is spawned at 0700 and told to collect data starting at 1100, the tape drive will be allocated from 0700.

g. If no time option is used, the GMC will start collecting data upon entry into the system and terminate upon a console request or tape limit request. When a time option is used, the GMC will terminate normally with a TS abort.

5.5.8 Special Debug. This option should not be used except under special request by the developers of GMC or by someone extremely familiar with the GMC design. It has been observed that for some reason (yet to be determined), the GMC will begin to record data to tape in a nonsequential fashion. This happens very infrequently and will probably never be observed by a site. When it does occur, the data reduction programs will print out warning messages that bad trace records are being processed, or that record sequence numbers are out of order. In most cases, the data reduction programs will recover and process normally.

This input option will cause the GMC to verify every record as it is written to tape. At any time that the collector determines an improper sequence is being written, it will abort with one of the following aborts:

R1 - Bad record written at WRBUF1

R2 - Bad record written at WRBUF2

R3 - First Record on a new tape has a bad record number at TAPD2

R4 - Tape write from disk has a bad record number at TAPWRT

R5 - Disk write has a bad record number at WRITIT

R6 - The disk write block number is bad at status check MLCC

R7 - The disk read block number is bad at status check DIRDCC

To use this option, simply type the letter K on the GMC data card.

5.5.9 Limited Mass Store Monitor/Channel Monitor Collection. In order to limit the amount of data being collected by the Mass Store and/or Channel Monitors, the user can request that only data being generated from certain jobs should be collected. To use this option, the characters MS must appear on the data card. If the "S" character is immediately followed by a blank, then only data for FTS, TS1 and $PALC will be captured. If the user desires, he may request that data

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from five additional SNUMBs also be captured. To use this option, the SNUMBs must appear on the data card immediately after the "S" character. No blank should be present between the "S" of the MS option and the first letter of the first SNUMB. The SNUMBs must be separated by commas (no intervening blanks) and the last SNUMB must be followed by at least one blank column before a new input option is requested.

5.5.10 Request the Next Data Card. If the user is unable to fit all the aforementioned parameters on a single data card, an additional data card can be used. The user must inform the GMC that a second data card will be present by placing an "X" on the first data card. The "X" must be the last entry on the first data card and must not be placed in the middle of an input option. A given input option should be completely described before the "X" option is used. No more than two cards can be used to describe all of the standard GMF options.

5.5.11 Disable the Dispatcher Queuing Option. In order to turn off the dispatcher queuing option of the CPU Monitor, the user should type the letter "Q" on the GMF data card. See subsection 5.2.3 for an explanation of dispatcher queuing monitoring.

5.5.12 Specifying Monitoring Requirements for the GRTM. In order to collect GRTM data, an M6 must not appear on the first data card. If the M6 is omitted from the first card, then the GRTM is active, in which case additional data cards are required. The datanet specifications must be placed on a separate data card and are not directly related with the previously described options. An "X" option must not be used to indicate that the datanet option card is present. If an M6 does not appear on the standard data cards then the GMC will expect an additional data card to follow any of the standard data cards that are present. The additional data cards are free format and indicate the datanets to be monitored, the HSLA subchannels to be monitored, and finally whether response time monitoring is to be performed. By default, only CPU resource monitoring will be conducted. As stated earlier, if the entire monitoring function is to be selected, the GRTS monitor will require approximately 2K of DATANET memory. On the other hand, if only the default option is selected, the monitor will require only 1K of DATANET memory. The required parameter categories are as follows:

Dn = FEP number (n=0 to 7)

HSLAn = High Speed Line Adapter (HSLA) number (n=1 to 3 per FEP)

SCHn = Subchannel numbers associated with each HSLA entry (n=0 to 31)

Table 6-4. (Part 2 of 2)

MASTER - Define SNUMBs that are considered to be SYSTEM programs - (all programs with a program number less than FSTSLV). In addition, the programs $TRAX, $HEALS and VIDEO will be considered system programs.

PALC - Change the print control for the PALC report (600 secs)

END - Required as last card of input. It must be present.

SPECL - Produce the Special Job Memory Reports

RN - Processing on a WW6.4 system

MAPART - Produce a memory map only when the number of jobs waiting memory surpasses a predetermined value.

ZERO - Include zero urgency jobs in all memory calculations (zero urgency jobs are not included).

6.1.6 Histogram Alterations (Action Code HISTG). A complete description of histogram default values and their meanings is provided in section 6.1.3. In order to change any histogram parameter, the user is required to supply a series of four data cards. The first card contains the action code HISTG. The second card specifies which histogram the user wants to alter. This specification is made by inputting the histogram ID number as obtained from table 6-1. The third data card describes the parameter to be changed and the fourth card provides the new value for the parameter. The following options are available:

Card #3	Card #4
LOWVAL	A new low value
SIZE	A new maximum histogram size
BUCKET	A new bucket size
HEADER	A two-word header separated by at least one blank. Each header word must not exceed six characters in length. If one of the headers is to be blank, the word BLANK must be typed on the data card.

Two additional points must be stressed.

- If the user wants to change multiple parameters for a single histogram, then cards 3 and 4 should be repeated as often as required. When alterations for a given histogram are completed, the user must supply a new action request. If the user desires to change another histogram, then the entire sequence of four data cards must be repeated.

- When inputting the new parameter values, the user must consult table 6-2 in order to determine whether the parameters must be inputted as integer (no decimal point), or as real numbers (decimal point must appear on data card).

Figure 6-1 shows a standard histogram format. Column five of this histogram has the words "NUMBER" and "WAIT." These are called the header labels and are used to describe the function being reported by this histogram. It is these two words that the user may modify with the HEADER parameter card. Figure 6-2 shows the input option formats for this action code.

6.1.7 Plot Alterations (Action Code PLOT). Modifications to a plot allow the user to specify a new plot size, a new maximum horizontal axis limit and a new minimum horizontal axis limit. The default values for the existing plots are described in section 6.1.4. As with the histogram option, the user is required to supply a series of four data cards for each parameter change desired. The first data card contains the action

6.1.21 Change the Program Number for the First Slave Job (Action Code FSTSLV). In the GCOS system, certain program numbers are assigned to system jobs. For example $CALC is program number 1, $PALC is program number 2, $SYOT is program number 3, etc. In the WWMCCS system, all programs with a program number less than 14 (decimal) are considered system programs. This option allows the user to alter this program number from its default value of 14. The first card contains the word FSTSLV and the second card contains the new program number. For non-WWMCCS systems, FSTSLV should normally be set to 8.

6.1.22 Request that Certain Jobs be Considered System Jobs (Action Code MASTER). There are certain jobs executed during the course of a day which have program numbers that would designate these jobs as user jobs (see subsection 6.1.21). However, in actuality they are system jobs and should be considered as system overhead. Examples of such jobs are VIDEO, HEALS, the GMF MONITOR, etc. This option allows the user to define up to ten jobs that should be considered as system jobs. The first card contains the Action Code MASTER. The second card contains the number of jobs to be defined as system jobs. The third card contains the SNUMB of each job to be considered as a system program. Each SNUMB must be followed by at least one blank column. It should be noted that VIDEO, $HEALS, the GMF Monitor and $TRAX will automatically be reported as system jobs and do not need to be requested via this option.

6.1.23 Allocation Status Report Print Control (Action Code PALC). Due to the excessive amount of output possible from the Allocation Status report, a time control can be set to print only those activities that are in any allocation state greater than the time limit. This time limit defaults to 600 seconds (10 minutes). The first card contains the word PALC and the second card contains the new time limit, in seconds.

6.1.24 Request the Special Job Memory Reports (Action Code SPECL). If the analyst desires to track the memory demands for a specified number of jobs (not to exceed ten), this input option should be invoked. This option will cause two reports to be produced. One report will indicate every time the requested job(s) was swapped or issued a MME GEMORE/GEMREL for memory, how long it was swapped, or how long the GEMORE was outstanding, and how much memory the job(s) required. In addition, every time the special job issues a MME GEMORE, a line from the Memory Map Report will be generated. This line is generated by default and is not dependent upon whether or not the Memory Map Report is enabled. When the analyst wants to match the Memory Map output to the Special Job output, he must do so based on the time value. For example, if the Special Job Report indicates that FTS issued a MME GEMORE at 16.81057, the user would then examine the Memory Map for a line of output with a time smaller than 16.81057, but where the time on the next line is greater than or equal to 16.81057. For example, the Memory Map might have a line of output with a time indication of 16.81052 where the next line of output was 16.81065. In this case, the line of output at 16.81052 shows what memory looked like at the instant in time that FTS issued the MME GEMORE. If the Special Job

Report indicates that FTS was swapped after issuing the MME GEMORE, the analyst could examine the Memory Map in order to determine why FTS was forced to swap.

A line of the Memory Map is also generated every time the GEMORE for the special job was denied or the special job was forced to swap in order for the GEMORE to be satisfied. This line of the Memory Map would show what memory looked like when the special job was denied the memory request or was swapped from memory. A final line of the Memory Map is produced whenever the special job's memory demand was met. For the swap/denied case and the memory-met case, the Special Job Report and Memory Map are matched by locating identical time values on each report. By generating the Memory Map, the analyst can determine if there are certain jobs that are preventing other jobs from acquiring required memory resources. In this case, the Special Job Report and Memory Map Report can be correlated by matching up the time values from both reports with the identical time values. This is especially useful in an analysis of the Timesharing Subsystem or the File Transfer System.

A second report will also be produced which indicates the average memory size of the job(s) during the course of its execution. This average is taken over increments of time where the time increment used, is the same increment that is used to produce the series of plots. The option consists of three cards where the first card contains the word SPECL, the second contains the number of jobs to be analyzed, and the third card contains the list of SNUMBs separated by at least one blank column.

6.1.25 Process Data on a WW6.4 System (Action Code RN). If the data reduction program is to be run on a WW6.4 system, the user must use this input option. It consists of the letters RN typed on a data card.

6.1.26 Produce a Memory Map Only Under Certain Memory Demand Conditions (Action Code MAPART). Due to the enormous amount of output generated by the Memory Map and Out of Core Reports, it is suggested that a site not produce these reports as a standard procedure. However, these reports are very useful in that they do provide a complete picture of memory as well as a total list of all jobs waiting for memory. In order to provide an analyst with the capability of obtaining these reports, without being buried in computer output, this option has been designed. When used, this option states that a line of the Memory Map and Out of Core Reports should be generated only when the number of activities waiting for memory surpasses a certain limit. To invoke this option, a two-card format is required. Card 1 contains the word MAPART and card 2 contains the number of activities that must be waiting memory before a line of output will be generated for the Memory Map and Out of Core Reports.

6.1.27 Include Zero Urgency Jobs in all Memory Calculations (Action Code ZERO). In several of the reports produced by the MUM, jobs with zero urgencies are not included in the statistical calculations. With the use of this option, zero urgency jobs will be included in all calculations.

The average value reported in this report minus the average value reported in report 3 will give a good feel for memory surplus or shortfall. A positive result will indicate a surplus while a negative result will indicate a shortfall. The MUM heading report also gives a surplus/ shortfall indicator. Any activity with an urgency of 0 that is currently in memory will have its memory size included in this availability figure. The reason for this is that if memory becomes a constraint, these activities can be swapped and their memory will become available for use.

For this report, an entry is made for each allocator call. For most analyses, this report will not be used since report 8 provides a more statistically accurate representation of this data.

6.3.3.6 Report 6 - The Memory Available When a Processor Went Idle. The previous report is repeated with the additional restraint that a processor has gone idle since the last allocator call. This aids in identifying either a bottleneck or a lightly loaded system.

For this report, an entry is made at each allocator call that had a processor go idle since the last allocator call. IDLEM data is used to produce this report. This report will not be produced if IDLEM was not active or the IDLEM Reports have been disabled via user input command.

6.3.3.7 Report 7 - The Time-Corrected Total Demand Outstanding. See report 16 for an explanation of time correction. The time-corrected total demand is the sum of all requests for memory known to the allocator as indicated in report 3. Activities with urgency 0 are not counted.

6.3.3.8 Report 8 - The Time-Corrected Memory Available. See report 16 for an explanation of time correction. This report reflects the time-corrected amount of total memory available as indicated in report 5.

6.3.3.9 Report 9 - The Number of Activities Waiting for Memory in Allocator Queue. This report identifies the depth of the allocator demand queue and includes all activites that are waiting for memory allocation. Activities with a 0 urgency are not considered as waiting for memory. This report aids in determining if too many or too few activities are getting to the Core Allocator from the Peripheral Allocator. For this report, an entry is made at each allocator call. For most analyses, this report will not be used since report 11 provides a more statistically accurate representation of this data.

6.3.3.10 Report 10 - The Number of User Activities Waiting Memory in Allocator Queue. This report is the same as report 9 except that it only counts those activites of a slave job as identified by their program number (program number 14 or greater). In order to change this program number test, the user should see Input Action FSTSLV. In addition, the user may specify up to ten additional programs that he wants considered as system programs, even though their program number exceeds 14. The user

should see Input Action MASTER in order to select this option. This report indicates the "user" work waiting allocation. For this report, an entry is made on each allocator call. For most analyses, this report will not be used since report 12 provides a more statistically accurate representation of this data.

6.3.3.11 Report 11 - The Time-Corrected Number of Activities Waiting Memory. See report 16 for an explanation of time correction. This report indicates the time-corrected number of activites waiting memory as in report 9.

6.3.3.12 Report 12 - The Time-Corrected Number of User Activities Waiting Memory. See report 16 for an explanation of time correction. This report indicates the time-corrected number of user jobs waiting memory in the allocators queue as in report 10. See report 10 for additional user options.

6.3.3.13 Report 13 - The Number of Activities Waiting Memory When a Processor Went Idle. Report 9 is the basis for this report, with the additional criteria that a processor must have gone idle since the last allocator call. An entry is made for each allocation where a processor has gone idle since the last call. IDLEM data is used to produce this report. This report will not be produced if IDLEM is not active or the IDLEM reports were disabled via user input commands.

6.3.3.14 Report 14 - The Number of Activites Residing in Memory. This report represents the number of activities allocated memory. It indicates the multiprogramming depth the system is obtaining. It is probably an upper level since an activity is allocated memory prior to and past actual usage. Any activity in memory, with a 0 urgency, is not considered as residing in memory. For this report, an entry is made for each allocator call. For most analyses, this report will not be used since report 16 provides a more statistically accurate representation of this data.

6.3.3.15 Report 15 - The Number of User Activities in Memory. The activites shown in this report are those that are in memory and have a program number greater than or equal to 14. These are user programs. For this report, an entry is made at each allocator call. As explained in report 14, any activity which has an urgency of zero will not be counted as being in memory. See report 10 for additional user options in defining system jobs and user jobs. For most analyses, this report will not be used since report 17 provides a more statistically accurate representation of this data.

6.3.3.16 Report 16 - The Time-Corrected Number of Activities in Memory. This report presents the same information as in report 14. The number of entries at each allocator call is determined by the time since the last allocator call. The result is a simulation of a uniform sample rate of allocator calls. Therefore, the noncorrected reports display the distributions as seen by the allocator itself. The time-corrected reports present the time weighted distributions. As an example assume that three

6.3.3.28 Report 33 - Elapsed Time Between Allocator Calls in 1/100 of a Second. This report shows the elapsed clock time between calls to the allocator and shows if the allocator is receiving sufficient service.

For this report, an entry is made for each user activity that terminates. This report will not be used for most analyses.

6.3.3.29 Report 34 - The I/O Time Charged per User Activity in Seconds. This report indicates the I/O time charged to each user activity.

For this report, an entry is made for each user activity that terminates.

6.3.3.30 Report 35 - The CP Time Charged per User Activity in Seconds. This report presents the CP time charged to each user activity. For this report, an entry is made for each user activity that terminates.

Reports 34 and 35 report the total CPU and I/O times used by a user activity while the monitor was active. These histograms are not generated for programs with program numbers less than 14 (i.e., system programs). See report 10 for additional user options in defining system activities and user activities.

6.3.3.31 Report 36 - The Number of Times a User Activity was Swapped. This report shows the swap count per user activity. The total number of swaps a user activity incurs is the user argument, as counted by the monitor. See report 10 for additional user options in defining system activities and user activities.

For this report, an entry is made for each user activity that terminates.

6.3.3.32 Report 37 - The Total Elapsed Time a User Activity was Swapped. This report indicates the total time a user activity was inactive due to a swap. After each swap is completed, an accumulator is updated, and if an activity is terminated, an entry is made to this report. See report 10 for additional user options in defining system activities and user activities.

6.3.3.33 Report 38 - The Number of Times a System Activity was Swapped. This report is the same as report 34 except for system activities. See report 10 for additional user options in defining system activities and user activities.

6.3.3.34 Report 39 - The Total Elapsed Time a System Activity was Swapped. This report is the same as report 35 except for system activites. See report 10 for additional user options in defining system activities and user activities.

6.3.3.35 Report 40 - Number of Extra Activities That Might Fit in Memory Using Compaction. This report shows how memory might have been used more optimally. It takes the total amount of available memory (displayed in

report 5) and attempts to fit in those activities waiting memory. If an activity fits, the memory available is decreased, and the next activity is tried. If an activity does not fully fit, the next activity is tried. This continues until all available memory is used or until all the activities waiting have been tried. The search starts at the first waiting program an progresses serially down the program numbers of those waiting. This search ignores the actual size of "holes" or quadrant-crossing and is not necessarily obtainable or optimal. For this report, an entry is made at each allocator call.

6.3.3.36 Report 41 - Number of Extra Activities that Might Fit Memory Without Compaction. This report is the same type as report 40. In this case, activities are fit into existing holes and are ordered by urgency. The search progresses down the activities serially, beginning at the highest urgency activity. This histogram presents a good picture of how well the core allocator is performing its function.

For this report, an entry is made at each allocator call.

6.3.3.37 Report 42 - The Percent of Size-Time Product Used by a User Activity. This report shows the percentage of users each activities' size-time product over its run-time duration. An entry is made for each user activity that terminates. See report 10 for an explanation of user and system activities.

6.3.3.38 Report 43 through 49 - The Length of Idle State in the Processors. The elapsed clock time of an idle state is given in these reports for each individual processor and also as an average for all processors. They supply an indication of how each processor was utilized versus the others in the system. They also provide information on how busy the processors are. These reports should be used in conjunction with reports 26 through 32.

IDLEM data is used to produce these reports. These reports will not be produced if IDLEM was not active or if the IDLEM reports have been disabled by user input command.

6.3.3.39 Report 50 - Original Allocation Time for User Memory in I/O Second. This report gives the time each user activty waited for its original allocation of memory. See report 10 for an explanation of user and system activities.

6.3.3.40 Report 51 - The Time-Corrected Percent of Assigned Memory Used. This report gives the time-corrected percentage of slave memory used over the monitoring period. Any memory being utilized by jobs with zero urgency will not be included in the memory-used figure for this report. See report 16 for a definition of Time Correction.

6.3.4 Activity Resource Usage Report. For each activity known to the monitor, a detailed Resource Usage Report is made upon termination of the activtyl. The report is ordered by termination time sequence, and the resource usage is that known to the system at the last allocator call (refer to figure 6-15).

Each activity is displayed via the SNUMB and activity number followed by the CP an I/O charge times expressed in milliseconds. This is the CP and I/O tmes generated during the monitoring session. The size-time product is the total K words times the microseconds of allocation time, which gives a better expression for the memory used by the job than the size of the job. The minimum and maximum core requirements of the job are then shown, including the activity Slave Service Areas (SSAs) as well as slave size.

The elapsed time, in hours, an activity was known to the allocator is followed by the number of timesthe job size changed for any reason. The wasted core column is calculated from the job Slave Prefix Area (SPA) word 37 octal. This is filled by the System Loader and may not be valid for all job types (i.e., an H* file is not loaded in the normal system load manner). This clumn is shown in order to help locate users that do not have the $LIMITS card set correctly for the memory being used. If the user appears to be requesting excessive core on his $LIMITS card, he may be using this extra space as a spare buffer area. If this figure shows an excessive misuse of the $LIMITS card, the user should be contacted and questioned.

The next two columns provide a count of the total number of swaps and moves incurred by the activity. The final columns of the entry gives memory allocation time, wait time, swap time, memory time, and GEWAKE time, all in tenths of a second for each activity. An entry will be made in this report for every activity of a job, when the activity completes. Upon termination of the monitor, the resource usage of all actiites known to the allocator will be reported, including system jobs. This output follows a full line of asterisks to denote that no termination records were found for these activities.

COLLECTED ON SYSTEM NMCC2 ON 80-12-15 AT TIME 12:39

ACTIVITY RESOURCE USAGE REPORT - REPORTED PER ACT SIZE

SNUMB-ACT	CPU & IO TIME (MS)	SIZE-TIME PROD	MIN	MAX	ELAPSED TIME	SIZE WASTED CHANGE	CORE	SWAPS	MOVES	TIME(.1 SEC) SPENT IN ALLOC	SWAP	MEMORY	GEWAKE
7332T- 0	44	1.5829E 08	31	31	0.003	0	0	0	0	51	0	55	0
7329T- 0	12077	2.6766E 09	32	32	0.023	0	0	0	0	0	0	837	0
$GENB- 0	275	1.7747E 07	11	11	0.001	0	0	0	0	2	0	16	0
7339T- 0	1300	2.5904E 08	40	40	0.008	0	0	0	0	234	0	41	0
7348T- 0	1421	1.3063E 08	31	31	0.042	0	0	0	0	1463	0	43	0
7338T- 1	991	8.1595E 07	12	12	0.016	0	2	0	0	512	0	67	0
7338T- 2	2267	2.6228E 08	25	36	0.003	2	0	0	2	15	0	83	0
7338T- 3	2761	3.7449E 08	45	56	0.006	2	0	0	2	131	0	83	0
7354T- 0	1360	2.1781E 08	40	40	0.002	0	0	0	0	5	0	55	0
7338T- 4	1766	3.5940E 08	42	53	0.005	1	6	0	1	110	0	76	0
XXXXX- 0	2388	4.8413E 08	11	11	0.016	0	0	0	0	146	0	440	0

FOLLOWING INFO MAY BE INCOMPLETE DUE TO LOST, DATA, NO EOF, OR ACTIVITY WAS ACTIVE WHEN MONITOR ENDED.

SYSTEM SCHEDULER CPU TIME, IO TIME AND SIZE-TIME PRODUCT ARE 43122911 129261145 0.19D 12

$PALC- 1	615091	2394913	2.9917E 11	17	17	6.822	0	0	988	108	0	17546	175982	52077
SYSOT- 0	626346	21551415	6.2101E 11	27	27	6.822	0	0	58	119	0	1877	230004	13728
$RGIN- 0	52768	167826	1.3920E 11	16	16	6.822	0	0	415	28	0	34039	87000	124567
-TSS— 1	12163737	13709653	3.1906E 12	77	187	6.822	58	0	0	0	0	0	245610	0
LOGON- 0	91433	59898	1.0459E 11	11	11	6.822	0	0	292	23	0	10302	95078	140228
FSYS - 0	0	90	2.7697E 10	9	9	6.822	0	0	0	0	0	0	30774	214835
NCP - 1	387705	72254	5.9289E 11	26	28	6.822	2	0	79	43	0	3452	216492	25664
TELNE- 1	231953	27456	2.5972E 11	16	17	6.822	2	0	150	22	0	5644	161220	78745
FTS - 1	216277	488796	1.7443E 11	24	51	4.732	176	0	191	111	9	3053	55649	111637
TLCF - 1	35090	32496	1.5089E 11	16	16	6.822	0	0	54	44	0	1839	94307	149462
DMTEX- 1	0	60	7.6714E 06	4	4	6.822	0	0	1	0	0	13	19	245577
DMSTA- 1	450328	1113536	1.5680E 11	8	8	6.822	0	0	717	76	0	13430	195994	36182
VIDEO- 1	116630	496	1.4735E 11	6	6	6.822	0	0	2	0	0	21	245588	0
7871T- 2	505393	384600	6.4366E 10	38	38	0.645	0	0	45	9	26	6263	16938	0
WAITL-999	0	0.		58	58	0.175	0	0	0	0	6291	0	0	0
$GENB- 0	673795	2019705	1.9096E 11	** MEMORY USE TIME * 8.6242E 09										

Figure 6-15. Activity Resource Usage Report

70 connects, or 10 connects per search. Then during the activity in which it was actually used, an additional two catalog searches (20 connects) were also required.

7.5.14 Connect Summary Report By Userid/SNUMB (File 23). If the user does not want to produce a complete File Code Summary Report, he may request that a report be produced for only certain USERIDs and/or SNUMBS. In this case, a much smaller File Code Summary Report (subsection 7.5.12) report will be produced. In addition, the user will receive a Connect Summary Report which will indicate, for the requested items, the number of times that USERID or SNUMB was referenced, the total number of connects made by that individual and the % of total connects represented by that item. If a requested SNUMB has a USERID equal to a requested USERID, then it will be reported twice in this report. See figure 7-14 for a sample of this report. This report is not produced by default and must be requested by a user input option (PROJ) (subsection 7.6.11).

7.5.15 Activity Summary Report (File 24). The Activity Summary Report lists each activity processed during the monitoring period and summarizes the activities as characterized by the eight variables: CP Time, Mass Storage Connects, Total Connects, and CP Time Per Connect (Mass Storage/Total) (see figure 7-15). The report lists the SNUMB-ACTIVITY number, the maximum number of I/O queues assigned to the activity, the maximum number of I/Os in process (transmission and/or queuing), the maximum number of intercom I/Os outstanding, the CP TIME (in milliseconds) charged by accounting to the job during the monitoring period, the number of connects issued to Mass Storage, the number of connects issued to Mass Storage and Tape, and the ratio of CP time over accesses for both Mass Storage Accesses and Mass Storage and Tape Accesses in the column headed CP TIME PER CONNECT. The bottom line of this report is titled TOTALS and gives the total charged processor time, the total connects, and the ratio of these totals.

System Schedular information for each activity (activity 0) is not reported separately. All activity 0 data is accumulated and reported as a single entry under the SNUMB $GENB. Any job whose SNUMB begins with a $ will not be considered as the System Scheduler, even if it processes as activity zero. In addition, NACE DERAIL jobs and BASHT jobs will also be processed as regular activities, even though they run under an activity number of zero. Finally, there is an input option (ZERO) that allows the user to define other zero activity jobs, that should not be considered as part of the System Scheduler.

Every activity that is processed is assigned buffer space so as to be able to initiate I/O. The standard default value for I/O queue buffer space is 5 I/O queues. However, methods are available for activities to acquire additional I/O queue space. The number of queues allocated to a given activity is outputted on this report. Following this column are two columns that provide an indication as to the amount of I/O being issued by a given activity. If the maximum number of I/O in process column displays

a number equal to the value in the I/O queue column, then this activity is probably being delayed because of a lack of sufficient I/O queue tables. If the maximum intercom outstanding column displays a value equal to one less than the value in the I/O queue column, then this activity is generating intercom I/Os at such a rate as to be exhausting the I/O queue table space. In this case also, the activity will be delayed.

Intercom I/O is the means by which two programs residing in the H6000 can pass data back and forth. TELNET and FTS use this technique extensively to pass and receive data from NCP. Whenever an activity exhausts its available I/O queue table allocation, a warning message will be printed on the status message report. This warning will indicate the time of day and the activity name that has exhausted its I/O queue resource. When the limit is no longer being reached, another warning message will be written indicating the activity is no longer at its resource limit.

The mass storage connects are displayed along with the total connects. For example, $PALC issued 906 mass storage connects and 1030 total connects. This represents 3.53 milliseconds of CPU time per mass store connect and only 3.10 milliseconds of CPU time between any connect type.

A line of asterisks are output when the monitor terminates in order to signify that the jobs that follow did not necessarily terminate. Information known about each job at the monitor termination is output. This report is on by default but may be turned off with a user input option (OFF) (subsection 7.6.9).

The report is useful in two applications. First, a quantitative feel for the CPU I/O balance of the system operation may be obtained from the TOTALS ratio of CP TIME PER CONNECT. Secondly, particular jobs which use excessive amounts of CPU or I/O time may be identified by SNUMB by scanning the list. More details on file usage of each activity in the Activity Summary Report are given on the File Code Summary Report. The $IDENT card of the job can also be found there for a more complete job identification.

7.6 Default Option Alteration

Most users rely upon the standard MSM Report formats and their default values as these suit a wide range of needs. A capability to change the reports is built into MSMDRP. The general form for all option requests are as follows: The first card contains an action code describing the action to be taken. Subsequent cards modify report parameters for some of the action codes. All input cards are free format with the only requirement being that at least one blank space separates multiple input parameters. The very last input card must have the word "END" entered in it. This card must be present whether or not any other input options are selected.

There is no specific order required of the options, and multiple entries of each are permissible. If several inputs refer to the same report, the last one encountered will have precedence. If a report is turned off by default and is modified, it will be turned on through the request for modification. The chart below shows the available actions: the mnemonic code for the user to identify the action; the function; and the default.

Mnemonic	Function	Default (indicated in parentheses)
AREA	Request file code references made to a specific area of a specific device	(not provided)
DEBUG	Debug	(no debug)
ERROR	Do not stop on Input Error	(stop)
FILDEF	Define system files by name	(no names used)
END	This card must be present	
MODULE	Produce the SSA Module Usage Report by Job	(no report produced)
NCONN	Process a limited number of connects	(total tape processed)
NREC	Process a limited number of tape records	(total tape processed)
OFF	Turn reports off	(all reports ON except reports 12,16, 18,20 - see table 7-1)
ON	Turn reports on	(all reports.on except reports 12,16, 18,20 - see table 7-1)
PROJ	Produce the Connect Summary Report by Userid/SNUMB	(no report produced)

RN	This option must be selected when .MSMDRP is used to process WW6.4 data or when MSMDRP is executed on a WW6.4 system (process WW7.2/4JS data on a WW7.2/4JS system)
TIME	Set a timespan for measurement (no time criterion)
TIMEQ	Change time quantum for Chronological Device Utilization Report (report is off - default value is 60 seconds)
USERID	Suppress userids from reports (userids printed)
RATECH	Change time quantum for Connects Per 10 Minute Report (report is off - default value is 10 minutes)
CAT	Turn on the Cat/File String Report (report off)
RATE	Request the Connect Per 10 Minute Report for specific user jobs.
LIMITS	Limit the amount of processing performed and reports produced.
ZERO	Process jobs with an activity number of zero.

7.6.1 Monitor a Specific Device Area (Action Code AREA). This option allows a user to specify specific areas of a device for which all jobs referencing this area are to be highlighted. The format of the display is that of a File Code Summary and contains those jobs and file codes that reference the area of interest.

The device to be investigated is identified via the PUB and IOM number. The specific areas of interest are identified as beginning at the starting address defined in llinks. The length of the area is also in llinks, with a zero meaning the end of the device. A total of ten possible areas are allowed. The format for this card is shown in figure 7-25.

See subsections 7.5.12 and 7.5.16 for complete details on the report format generated with this user option. This report is off by default and will be activated by the processing of this action code.

7.6.2 System Debug (Action Code DEBUG). This is a restricted option for GMF system developers. DEBUG should only be used with guidance received by CCTC/C751.

7.6.3 Continue Data Reduction After an Input Option Error (Action Code ERROR). This option allows data reduction to continue when an error has

been detected and reported in an input option request. The default value reports the error and aborts the data reduction procedures. The format for this option is the word ERROR on the data card.

7.6.4 Specify System File Names (Action Code FILDEF). This option allows the user to specify the name of each system file displayed in the

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7.6.16 Change the Time Quantum Value for the Connect Per 10 Minute Report (Action Code RATECH). The user can change the time quantum value used to produce the Connect Per 10 Minute Report by inputting the quantum in seconds. Two cards are required. The first card contains the word RATECH and the second card contains the new quantum in minutes. The default value is 10 minutes.

7.6.17 Turn on the Cat/File String Report (Action Code CAT). This option, consisting of the word CAT on the data card, will turn on the Cat/File String Report (see subsection 7.5.13).

7.6.18 Request the Connect Per 10 Minute Report for Specific User Job (Action Code RATE). This option will allow the user to obtain the Connect Report for specific jobs as well as for the TimeSharing Subsystem and the Total System (see subsection 7.5.24). Card number 1 contains the word RATE, card number 2 the number of jobs desired (a maximum of 8 are permitted), and card number 3 the SNUMBs of the jobs desired. In addition to the requested jobs, the TimeSharing Subsystem as well as the Total System will also be reported. If multiple copies of TSS are in use, all activity will be reported under the single job name of TS1. If the user wants to obtain this report for only TimeSharing and the Total System, then he simply needs to use the "ON" input option using the name "RATE" for the required report ID.

7.6.19 Limit the Processing and Output (Action Code LIMITS). This option will allow the user to control the amount of output produced and the amount of record processing performed. Card number 1 contains the word LIMITS and card number 2 contains either the word ONLYSP or the word NOHIST or the word SUMARY. If the word ONLYSP is used then the Mass Store Monitor program will process only those data records that are generated by the SNUMBs requested under the RATE input option (see subsection 7.6.18). All other data will be ignored. The user must take care when examining the histograms and reports that are produced. The user must remember that only a limited amount of data has been processed. If the word NOHIST is used then no seek or space utilization histograms will be produced. This option can be used in conjunction with the ONLYSP option (must have two LIMITS input cards) or can be used by itself. In the latter case, all data will be analyzed, but no histograms will be produced. Finally, the user can request a summary of the seek movement activity. He can obtain this summary whether or not he selects to produce the set of histograms. To obtain the summary report, he must type SUMARY on a card immediately following the LIMITS card. A summary listing will not be produced for the space histograms, as this summary information is meaningless for this set of histograms.

7.6.20 Zero Activity Processing (Action Code ZERO). This option allows the user to define up to 10 jobs which the user desires to see handled as normal activities, even though they process with an activity number of zero. Under normal conditions, any activity processing with an activity number of zero will be considered a System Scheduler Job (see subsection

7.5.15). To use this option, the first data card should have the word ZERO. The second data card contains the number of jobs following on the third card. This number may not exceed 10. The third card contains the list of SNUMBs, separated by at least one blank column.

7.7 JCL

The data reduction procedures consist of a single FORTRAN program having a main level and multiple subroutines.

A description of the more important JCL cards is presented below (see figure 7-28).

The $:LIMITS card should be studied to meet user needs. The run time (99) and output limit (30K) may both need to be altered as required by the duration of the monitoring run. The MSMDRP requires 55K of memory in order to execute plus an additional 2K for SSA space. During the initial loading process, MSMDRP will actually require 68K of memory, but 11K will be released immediately upon loading.

The statement:

```
$    DATA        I*
```

is used to identify the data cards that follow as described in subsection 7.6. At least one data card is required, that being an "END" request.

7.8 Multireel Processing

If more than a single reel of data has been collected, a series of messages will be outputted to the console informing the operator that a new data reel is required. The following are the messages produced.

a. DISMOUNT REEL #XXXXX THEN MOUNT REEL NUMBER YYYYY ON ZZZZZ

   In this case, XXXXX is the old reel number, YYYYY is the new reel number, and ZZZZZ is the tape drive ID.

   If the operator fails to mount the new tape, the above message will be repeated three times, after which the program will terminate, and all reports produced.

b. IS TAPE XXXXX MOUNTED ON DRIVE ID YYYYY (Y/N)

   In this case, XXXXX is the tape number being requested for mounting and YYYYY is the tape drive ID.

   This message occurs when the data reduction program finds the wrong tape has been mounted (by comparing internally generated tape labels). If the operator answers N, the message in (c) below

```
Col 1       8           16
$           IDENT       1820251/30/3044
$           SELECT      B29IDPX0/OBJECT/MSM
$           TAPE        01,X1D,,12345
$           LIMITS      99,55K,-4K,30K
$           DATA        I*
            Data cards - at least an "END" card must be present
$           ENDJOB
```

Figure 7-28. DRP MSM JCL

is produced. If the operator answers Y, the data reduction program will terminate and all reports will be produced. In this case, the data reduction program is unable to process the tape. Even though the operator is mounting the correct tape, the internal label on the new tape does not match that being requested by the old tape. The user should check the data collection session to insure that the operator did not respond with an incorrect tape number during multireel change.

After entering the Y or N, the operator will need to hit the EOM key twice in order for the response to be transmitted.

c. WRONG REEL JUST MOUNTED, DISMOUNT AND MOUNT REEL XXXXX ON ZZZZZ

In this case, XXXXX is the new reel number, and ZZZZZ is the tape drive ID.

d. CAN TAPE XXXXX BE MOUNTED ON DRIVE YYYYY (Y/N)

In this case, XXXXX is the new desired reel and YYYYY is the tape drive ID.

If the operator fails to answer this message it will be repeated until he responds with a "Y" for YES or "N" for NO. If he types in "Y", then message (a) will be repeated. If the types in "N", then the program will be terminated and all reports will be produced.

7.9 Tape Error Aborts

During the course of processing it is possible that the operator will be required to abort the data reduction program due to an irrecoverable tape error. If such a condition occurs, the operator should abort the job with a "U" abort. This will allow the data reduction program to enter its wrap-up code processing and produce all reports generated prior to the tape error.

8.5.11 Activity Statistic Report (Files 23 and 24). Figure 8-20 shows the Activity Statistical Report (Parts 1 and 2). For each activity run in the system, Part 1 of this report displays the SNUMB, the activity number, the queue time (in .1 sec) that the activity accumulated for tapes and disks, the connect time (in .1 sec) that the activity accumulated for tapes and disk, and finally, the IDENT and USERID of the activity. The connect time on this report is computed by using as the start time the issuance of trace 7 and as the stop time the issuance of a trace 4. The value output in this report may differ significantly from the value output by SCF. In the opinion of CCTC (C751), the value given by this report more closely approximates the true connect time for an activity. Part 2 of this report gives the number of connects issued to tape and disk by each SNUMB and activity number, and the average queue time for each connect.

By using this report, it is possible to determine those activites which are being queued the most. By examining Mass Store Monitor output for these activities, it could be determined what files and packs were referenced by the activity and possibly some file reorganization could be performed.

System Schedular information for each activity (activity 0) is not reported separately. All activity 0 data is accumulated and reported as a single entry under the ~~SNUMB $GENB~~. Any job whose SNUMB begins with a $ will not be considered as the System Scheduler, even if it processes as activity zero. In addition, NACE DERAIL jobs and BASHT jobs will also be processed as regular activities, even though they run under an activity number of zero. Finally, there is an input option (ZERO) that allows the user to define other zero activity jobs, that should not be considered as part of the System Scheduler.

From all the reports produced thus far, it is still not possible to determine if particular jobs are in conflict with each other. This information would be extremely useful in being able to move conflicting program files to different disk packs or in scheduling conflicting jobs during different times of the day. There is a CMDRP option that allows the user to obtain a Job Conflict Report for up to four unique devices (see subsection 8.5.12). The user would first determine those devices displaying the largest degree of queuing, or those devices containing the files of the programs receiving the largest queue times and rerun the CMDRP requesting the Job Conflict Report option (see subsection 8.6.1).

8.5.12 Job Conflict Report (Files 31, 32, 33, 34). In figure 8-21, we have a Job Conflict Report for Device ID #10. The first line of the report will give the date, time, and system name on which the data was collected. A separate report will be produced for each device requested by the user with the Device ID number appearing in the upper right hand corner of the report. The first column of the report will list the SNUMB/Activity Number of every job that was queued or caused some other job to be queued on this particular device. The USERID and IDENT for this SNUMB is also reported. Under the column "QUEUED BY" will appear a list of SNUMBs that caused such

a delay. For example, $CALC was delayed by $ PALC 1 time and by $ SYOT 1 time. Under the column "QUEUED" will appear a list of SNUMBs that were delayed by this particular job and the number of times this delay occurred. Therefore, $CALC delayed $ GENB 1 time and itself just one time. Anytime that a given job has been queued by, or queued, 20 different

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ACTIVITY STATISTIC REPORT PART 1 FOR NMCC2 ON 80-10-06

SNUMB ACTIVITY	QUEUE TIME (.1 SEC) TAPES	QUEUE TIME (.1 SEC) DISK	CONNECT TIME (.1 SEC) TAPES	CONNECT TIME (.1 SEC) DISK	IDENT	USERID
7151T- 1	0	0	0	16	1820020/30/6031,BETTY LAFAVERS	DJ3JI32419
TEST - 1	0	0	0	11	1820251/30/2773,C751	DJ8XI70203
7170A- 1	0	0	0	4	XXXNO,SC-PURGE	OPNSUTIL
7170A- 2	12	0	100	65	XXXNO,SC-PURGE	OPNSUTIL
$CALC- 0	0	1	0	49		
$PALC- 1	5	3	1	124		
$SYOT- 0	0	0	0	18		
$RTIN- 0	0	0	0	10		
TSS - 1	0	0	0	167		
$TOLT- 0	0	0	0	15		
$LOGN- 0	0	0	0	2		
NCP - 1	0	0	0	6		
$GENB- 0	0	7	0	1580		
DMSTA- 1	0	0	0	217	ZZZ,OPNSTIL	OPNSUTIL
TEST - 1	0	0	0	10	1820251/30/2773,C751	DJ8XI70203
7170A- 3	0	0	0	2	XXXNO,SC-PURGE	OPNSUTIL
MUM - 1	1	0	235	2	ZZZ,OPNSTIL	OPNSUTIL
HEALS- 1	0	0	0	4	ZZZ,OPNSTIL	HEALS-DATA

Figure 8-20. Activity Statistic Report (Part 1 of 2)

reaching the end of the new data, would attempt to process the old data without realizing that is was old. The check on the Julian date prevents this from happening. The CMDRP will terminate cleanly and all reports will be produced.

- HAVE INCREASING OR BAD SEQUENCE NUMBERS . . . .
  or
  BAD TRACE RECORD . . . .
  A problem has occurred in reading the data tape. If the run is reprocessed, the error may disappear. If it reoccurs, then the tape was generated with an error. In most cases, the CMDRP will recover and processing will not be significantly affected.

- PROCESSING TERMINATED BY NXTRECRD . . . .
  CMDRP has requested that the operator mount a new tape and the operator has responded that he did mount the new tape or is unable to mount the new tape. If he has mounted the new tape, CMDRP is unable to match the initial record or the new tape with the last record on the old tape. User should check the data collection procedure to insure that correct tapes were mounted during the data collection phase. CMDRP will terminate cleanly and all reports will be produced.

- . . . . . CALL CCTC AT . . . . . .
  A series of messages may be produced which indicate a severe processing error. If these occur, the output of the run should be considered suspect until further clarification is obtained from CCTC.

8.6 Default Option Alteration

Most users rely upon the standard CMDRP report formats and their default values as these suit a wide range of needs. A capability to change reports is built into CMDRP.

All inputs are free format with the only requirement being that if any value is to be a zero, the user must type the number 0 on the data card. A zero value may not be inputted as a blank. At least one data card is required; that being the word "END" punched on the data card. The "END" card must be the last data card inputted to the program. It is used to signify the end of input, or the fact that there is no input available. In the Channel Monitor, all reports except the Job Conflict Report (subsection 8.5.12), the Special Job Processing Report by Device (subsection 8.5.13) and the Special Job Processing Report Per 10 Minute Report (subsection 8.5.14) are produced unless explicitly turned off. If the Channel Statistics Reports (subsection 8.5.6) are not desired, they may be turned off using the "OFF STANDARD" format. Individual reports cannot be turned on or off and individual histograms also cannot be turned on or off. If the Activity Statistic Report (subsection 8.5.11) is not desired it may be turned off, using the "OFF STATISTICS" format.

8.6.1 Job Device Conflict Report (Action Code QDEV). This option allows the user to produce the Job Device Conflict Report for up to four (4) different devices. If more than four devices are requested, only the first four devices will be analyzed. The first data card contains the word "QDEV". The second data card contains the number of devices to be analyzed. This value cannot exceed 4. The third data card contains a list of unique device IDs, separated by at least one blank. The unique device IDs can be obtained from the Physical Device ID Correlation Report.

8.6.2 Program Debug Options. There are several debug options available to the user, none of which should be selected unless the user is very familiar with the data reduction program. These options produce large amounts of output, useful only when debugging data reduction program/logic errors.

8.6.2.1 Program Number Debug (Action Code DPRG). This will allow debugging for a given program number. Card 1 contains the word "DPRG", and card 2 contains the program number for which debugging is to occur.

8.6.2.2 Device Debug (Action Code DDEV). This will allow debugging for a given unique device ID. Card 1 contains the word "DDEV", and card 2 contains the unique device ID for which debugging is to occur.

8.6.2.3 Queue Location Debug (Action Code DQUE). This option will allow debugging for a given IO queue location. Card 1 contains the word "DQUE", and card 2 contains the IO queue location for which debugging is to occur. The queue location is inputted as a decimal value.

8.6.2.4 Random Access File Debug (Action Code DEBUG). This option will allow debugging to occur whenever the random file containing excess histograms is read or written. One data card containing the word "DEBUG" is all that is required.

8.6.2.5 Channel Debug (Action Code DCHN). This option will allow debugging to occur for a given channel (ACTCHN). This is not input as an actual channel number, but rather as a relative channel number. Card 1 contains the word "DCHN", and card 2 contains the relative channel number for which debugging is to occur.

8.6.3 Removal of Queue Entries (Action Code DELTA). As explained in subsection 8.5.6.7, it is possible for a T22 trace to be generated and never followed by a corresponding T7-Connect Trace. As long as the T22 trace is active, it will be considered as an active I/O request and may effect the queue reports and histograms. If a connect trace has not occurred within a 5-second (default) time span, this T22 trace will automatically be removed from the queue tables and an entry will be made into the Device ID STIOS Not Connected Report. This option allows the user to alter the 30-second default value. Card 1 contains the word "DELTA", and card 2 contains the default time inputted in milliseconds.

completely processed. Using this option, the user can process the tape or tapes up to the point where the tape error exists. This option requires two data cards. The first data card contains the word NREC with the second card containing the number of tape records to be processed.

8.6.10 Special Job Processing Reports (Action Code JOB). The Special Job Processing Report described in subsections 8.5.13 and 8.5.14 can be obtained with this option. These reports will not be produced unless this option is invoked. The format consists of three data cards. Card 1 contains the word JOB, card 2 contains the number of special jobs to be reported (not to exceed 8), and card 3 contains the actual SNUMBs, separated by at least one blank column.

8.6.11 Change the Time Quantum Value for the Special Job Processing Report Per 10 Minutes (Action Code RATE). The user can change the time quantum value used to produce the Special Job Processing Report Per 10 Minute by inputting a new time quantum in seconds. Two cards are required. The first card contains the word RATE and the second card contains the new quantum in minutes. The default value is 10 minutes.

8.6.12 END Card (Action Code END). This card must be present at all times and must be the last data card supplied. It consists of the word END typed on the card.

8.6.13 Limit the Processing and Output (Action Code LIMITS). This option will allow the user to control the amount of output produced and the amount of record processing performed. Card number 1 contains the word LIMITS and card number 2 contains either the word ONLYSP, the word NOHIST, or the word SUMARY. If the word ONLYSP is used then the Channel Monitor program will process only those data records that are generated by the SNUMBs requested under the JOB input option (see subsection 8.6.10). All other data will be ignored. The user must take care when examining the histograms and reports that are produced. The user must remember that only a limited amount of data has been processed. If the word NOHIST is used then no histograms will be produced. This option can be used in conjunction with the ONLYSP option (must have two LIMITS input cards) or can be used by itself. In the latter case, all data will be analyzed, but no histograms will be produced. Finally, if the word SUMARY is used then the user will not receive any histograms, but he will receive a single line of print for each device which provides the same information that occurs on the summary line of each histogram (last two lines of a histogram). The SUMARY option can be used in combination with either of the other two options (i.e., the user can turn off histograms and only receive the summary, or he can receive both the summary and the histograms). A sample of the summary reports is not provided in this document.

8.6.14 Zero Activity Processing (Action Code ZERO). This option allows the user to define up to 10 jobs which the user desires to see handled as normal activities, even though they process with an activity number of

zero. Under normal conditions, any activity processing with an activity number of zero will be considered a System Scheduler Job (see subsection 8.5.11). To use this option, the first data card should have the word ZERO. The second data card contains the number of jobs following on the third card. This number may not exceed 10. The third card contains the list of SNUMBs, separated by at least one blank column.

8.7 JCL

The data reduction procedures consist of a single FORTRAN program having a main level and multiple subroutines. A description of the more important JCL cards is presented below (see figure 8-25).

The $ LIMITS card should be changed to meet the user needs. The run time (99) and output limit (30K) may both need to be altered as required by the duration of the monitoring run. The CMDRP requires 48K of memory in order to execute plus an additional 2K for SSA space. During the initial loading process, CMDRP will actually require 60K of memory, but 10K will be released immediately upon loading.

The statement

```
$ DATA I*
```

is used to identify the data cards that follow as described in subsection 8.6. At least one data card is required, that being an "END" request.

8.8 Multireel Processing

If more than a single reel of data has been collected, a series of messages will be outputted to the console informing the operator that a new data reel is required. The following are the messages produced.

a. DISMOUNT REEL #XXXXX THEN MOUNT REEL NUMBER YYYYY ON ZZZZZ

   In this case, XXXXX is the old reel number, YYYYY is the new reel number, and ZZZZZ is the tape drive ID.

   If the operator fails to mount the new tape, the above message will be repeated three times, after which the program will terminate, and all reports produced.

b. IS TAPE XXXXX MOUNTED ON DRIVE ID YYYYY (Y/N)

   In this case, XXXXX is the tape number being requested for mounting and YYYYY is the tape drive ID.

   This message occurs when the data reduction program finds the wrong tape has been mounted (by comparing internally generated

```
COL   1        8          16

      $        IDENT      1820251/30/3044
      $        SELECT     B29IDPX0/OBJECT/CM
      $        TAPE       01,X1D,,12345
      $        LIMITS     99,50K,-4K,30K
      $        DATA       I*
      $        Data Cards - at least an "END" card must be present
      $        ENDJOB
```

Figure 8-25. CMDRP JCL

tape labels). If the operator answers N, the message in (c) below is produced. If the operator answers Y, the data reduction program will terminate and all reports will be produced. In this case, the data reduction program is unable to process the tape. Even though the operator is mounting the correct tape, the internal label on the new tape does not match that being requested by the old tape. The user should check the data collection session to insure that the operator did not respond with an incorrect tape number during multireel change.

After entering the Y or N, the operator will need to hit the EOM key twice in order for the response to be transmitted.

c. WRONG REEL JUST MOUNTED, DISMOUNT AND MOUNT REEL XXXXX ON ZZZZZ

In this case, XXXXX is the new reel number, and ZZZZZ is the tape drive ID.

d. CAN TAPE XXXXX BE MOUNTED ON DRIVE YYYYY (Y/N)

In this case, XXXXX is the new desired reel and YYYYY is the tape drive ID.

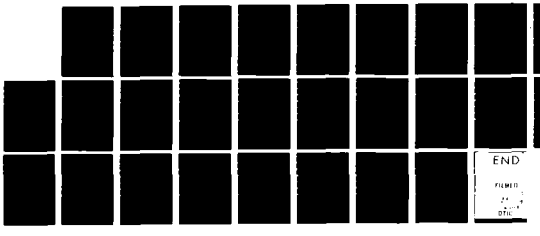
If the operator fails to answer this message it will be repeated until he responds with a "Y" for YES or "N" for NO. If he types in "Y", then message (a) will be repeated. If he types in "N", then the program will be terminated and all reports will be produced.

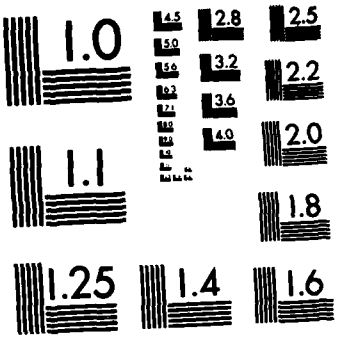
8.9 Tape Error Aborts

During the course of processing it is possible that the operator will be required to abort the data reduction program due to an irrecoverable tape error. If such a condition occurs, the operator should abort the job with a "U" abort. This will allow the data reduction program to enter its wrap-up code processing and produce all reports generated prior to the tape error.

AD-A126 235 GENERALIZED MONITORING FACILITY USERS MANUAL CHANGE 5 (U) COMMAND AND CONTROL TECHNICAL CENTER WASHINGTON DC 01 APR 83 CCTC-CSM-UM-246-82-CHG-5 2/2

UNCLASSIFIED F/G 9/2 NL





SECTION 9. COMMUNICATIONS ANALYSIS MONITOR DATA REDUCTION PROGRAM (CAMDRP).

9.1 Introduction

The Communications Analysis Monitor Data Reduction Program is a FORTRAN program that sequentially processes data the Communications Analysis Monitor collected and wrote on tape. CAMDRP produces a number of reports depicting the usage of terminals, the response being received by terminals and the various DAC subsystems, and a special analysis report on Time Sharing Response. Report descriptions are presented in subsection 9.5.

There are two inputs to the CAMDRP. The first is the data tape produced by the CAM in the General Monitor Collector. The second is a set of report option control cards used to alter the reports in some way other than the standard default. The various user input options and their formats are described in subsection 9.6. The actual reports produced by CMDRP are described in subsection 9.5.

9.2 Data Collection Methodology

The CAM in the General Monitor Collector processes a GMF generated trace type 14 and collects information to monitor the usage of the entire terminal and DAC subsystems. The information collected on the occurrence of the above trace enables the CAMDRP to identify the DAC Subsystem Activity, response time being received by both DAC subsystems and terminals, and the extent to which any terminal is being utilized. The method used for generating the CAM traces is described in subsection 5.2.6 and the formats for the CAM generated records used by the CAMDRP are described in subsection 5.4.7.

9.3 Analytical Methodology

All communications between the H6000 and an online user is controlled by the GCOS module .MDNET (.DNWW in W6.4). This module contains a series of buffers, called mailboxes, that are used to store data passing between the datanet and the H6000. Whenever either machine wants to communicate with the other, information is placed in a mailbox and an interrupt is generated. The Communications Analysis Monitor (CAM) is designed to examine the mailboxes each time they are changed and to generate a GMF trace type 14. The trace type 14 is used by CAMDRP to provide data transfer rates, machine response times and user think times. The data transfer rates are derived from the number of words transferred for each interaction. Machine response time can have multiple definitions. One definition is the amount of time from the transfer of the first character of data by the user (carriage return) to the first response back to the user from the system. This definition is not precise in that TSS transmits a CLEAR SCREEN ACK back to the terminal prior to actual data transmission. Several seconds may pass before the user receives any usable data at his screen.

A second definition of response time is the same start time (carriage return) but the stop time is when the user has received his last piece of data before being required to give another response. In the case of multiscreen output, response ends when the user is requested to input a screen clear. This definition also is not precise in that the system response is not complete until possibly a full screen of data has been transmitted. This definition also lumps GCOS and subsystem (TSS, TRAX) response together. However, it is felt that this method is a more realistic method of response time calculation, and is the method used by CAMDRP.

NOTE: Users monitoring a job execution will be credited with a large response time, usually equal to the job execution time since the status monitoring subsystem requires no input until the job is finished. These users will be reported in the out-of-range response time average.

User think time is defined by CAM to be the amount of time from the start of data transmission to the user until the receipt of the first character of user response. This includes any datanet delay time (monitored by the datanet monitor) and any user wasted time (coffee break, phone call, etc.). However, this is the best definition available with the type of data captured by the CAM. Figure 9-1 presents a pictorial representation of these definitions.

9.4 Data Reduction Methods

The CAMDRP reads only the trace type 14 records and any special records. It ignores lost data records, which can cause loss of some logons and disconnects. The CAMDRP logs a user onto a subsystem only when "connect to slave" command is captured. This command gives the actual subsystem the user is connecting to (TSS, TRAX, etc.). If, when CAMDRP first begins processing, a user is found to already be logged onto the system and no "connect to slave" command has been found, the user is logged onto an "UNKNWN" subsystem. This is because the "connect to slave" command is the only time the actual subsystem name is known. However, for every terminal logged on to TSS, each time a response is generated, the USERID of the terminal user is collected. CAMDRP uses this information to log the user on to TSS.

If, during processing, a datanet is found to have crashed, all users connected to that datanet are disconnected by the CAMDRP and processed as an end terminal session. If a reduction time frame ends, all users are disconnected as if their terminal session ended, and all reports are printed.

9.5 CAMDRP Output

The CAMDRP produces a header page and either a 355 Mailbox Report or Statistical Summary Reports, Terminal Session Reports, and requested histograms. The following subsections will describe all the reports produced by the CAMDRP.

9.5.3 Statistical Summary Reports. These reports are produced unless the user specifically requests the 355 Mailbox Report. The Statistical Summary Reports include DAC Device and Subsystem Summaries, Remote Batch Device Summary, and Terminal ID Summary.

9.5.3.1 DAC Devices Summary Report. The DAC Device Summary Report (shown in figure 9-4) indicates the activity for each of the different DAC terminal types utilized during the data collection session. The distinctive device types include TTYs, IBM 2741, and several categories of displays (e.g., VIP786W and 7705). Also represented in these reports are devices which use DAC protocols, such as the DN355-DN355 link implemented between the CCTC and ANMCC.

For each DAC device, the following values are reported in terms of mean and standard deviation (where appropriate):

- Number of sessions collected - Number of terminal sessions accumulated in this category.
- Session length (sec) - Time from log-on to log-off
- Input length (char) - Number of characters in an input
- Output length (char) - Number of characters per output
- Number of outputs/output group - Number of distinct outputs in consecutive order (total output length = output length times the number of outputs/output group)
- User think time (sec) - Time from start of last output transfer in output group to end of input transfer
- Machine response time (sec) - Time from end of input transfer to request for next input transfer (see definition in section 9.3)
- Inter-output time (sec) - Time from start of previous output transfer to start of succeeding output transfer
- Character rate (char/sec) - Total number of characters transferred, divided by the terminal session length.
- Number of inputs - Total number of user responses during the time period.
- Average number of inputs - Average number of user responses per session (number of inputs/number of sessions collected)
- Number outputs - Total number of system responses during the time period

DAC DEVICE SUMMARY FOR NMCC2 ON 122181

	VP7705		TTY	
	MEAN	STD DEV	MEAN	STD DEV
# SESSIONS COMPLETED	39.		2.	
SESSION LENGTH (SEC)	1044.9	1415.4	2460.0	2037.9
INPUT LENGTH (CHAR)	22.6	53.4	4.4	1.5
OUTPUT LENGTH (CHAR)	245.7	241.7	44.6	13.0
# OUTPUTS PER OUTPUT GROUP	1.9	38.8	1.0	0.2
USER THINK TIME (SEC)	17.8	35.4	6.4	7.5
MACHINE RESPONSE TIME (SEC)	3.2	17.6	0.3	1.1
INTER-OUTPUT TIME (SEC)	1.7	1.4	1.0	0.
CHARACTER RATE (CHAR/SEC)	38.6	39.1	0.5	0.7
# INPUTS	975.0		25.0	
AVG # INPUTS	25.0		12.5	
# OUTPUTS	5392.0		50.0	
+ AVG # OUTPUTS	138.3		25.0	
FLAG	0		0	

FLAGS:

0 - NORMAL LOG-ON, DATA COLLECTION, TERMINATION.
2 - DUPLICATE ID ENCOUNTERED DURING LOG-ON. OLD ID LOGGED-OFF.
5 - TERMINAL LOGGED-ON VIA SUBROUTINE INSERT. NONSTANDARD PROCEDURE.
THIS FLAG HAS BEEN DELETED FOR NON-BATCH TERMINALS.

Figure 9-4. DAC Device Summary Report

- Average number of outputs - Average number of system responses per session (number of outputs/number of sessions collected

- Flag - Logical flags indicating any unusual conditions in this category. Flag explanations appear on the printout.

The user should note that summaries for the same batch device with different flags are not mixed. Thus, for example, there may be several summaries for RLP 3000 with the majority of normal sessions reflected in one summary and exceptions in the others. The exceptions imply conditions such as GMC starting its collection in the middle of some terminal session for which the session length cannot be determined.

9.5.3.2 DAC Subsystem Summary Report. The DAC Subsystem Summary Report (figure 9-5) summarizes the characteristics of users of DAC subsystems such as TSS and TPS. The heading of each report gives the subsystem utilized. The categories summarized are the same as those categories discussed in subsection 9.5.3.1.

Invariably, a number of the subsystems summarized are bogus due to user typing errors. For example, the following misspellings of TSS may appear: 'YSS', and 'TS'. These reports do not imply that these subsystems exist, only that some user attempted to log-on to a system with that name. Users logged onto a subsystem other than TSS and prior to the CAM starting will be considered as logged onto subsystem UNKNWN (see subsection 9.4).

9.5.3.3 Remote Batch Device Summary Report. The Remote Batch Device Summary Report profiles the devices using remote batch mode communication protocols such as remote line printers (RLP300) and remote computers (RCT) (figure 9-6).

For each device, the following values are reported:

- Number of jobs collected - Total number of distinct jobs reflected in this report.

- Number of input jobs - That part of the total number of jobs which are input jobs.

- Number of output jobs - That part of the total number of jobs which are output jobs. Certain RCT (H716) reports contain jobs that may be counted as both input and output; more detailed examination of the raw data is required to verify this circumstance.

- Job length (sec) - Time from the first to the last data transfer for that job.

DAC SUBSYSTEM SUMMARY FOR NMCC2 ON 122181

	TPE		TSS		UNKNWN	
	MEAN	STD DEV	MEAN	STD DEV	MEAN	STD DEV
# SESSIONS COLLECTED	1.		27.		4.	
SESSION LENGTH (SEC)	104.0	0.	1345.2	1493.2	1003.8	1612.4
INPUT LENGTH (CHAR)	8.0	7.3	23.3	54.5	0.	0.
OUTPUT LENGTH (CHAR)	35.5	62.1	89.5	222.0	438.1	69.6
# OUTPUTS PER OUTPUT GROUP	1.0	0.2	1.0	0.1	610.8	979.0
USER THINK TIME (SEC)	4.6	4.0	18.3	36.0	0.	0.
MACHINE RESPONSE TIME (SEC)	4.0	9.3	3.3	17.9	0.	0.
OUTPUT TIME (SEC)	0.	0.	0.0	0.2	1.7	1.3
CHARACTER RATE (CHAR/SEC)	16.0	0.	11.8	12.0	281.5	325.0
# INPUTS	12.0		934.0		0.	
AVG # INPUTS	12.0		32.6		0.	
# OUTPUTS	42.0		2819.0		2443.0	
AVG # OUTPUTS	42.0		104.4		610.8	

Figure 9-5. DAC Subsystem Summary Report

TERMINAL ID SUMMARY FOR MICC2 ON 122181

	RC	RCT	D7	VP7705	D1	VP7705
	MEAN	STD DEV	MEAN	STD DEV	MEAN	STD DEV
SESSIONS OR JOBS COLLECTED	3.		4.		4.	
SESSION (JOB) LENGTH (SEC)	94.7	65.7	979.8	1478.5	1070.3	1556.2
INPUT LENGTH (CHAR)*1*	93.9	279.7	24.4	39.4	42.9	78.4
OUTPUT LENGTH (CHAR)*1*	3.9	7.6	50.1	80.7	59.0	88.9
BATCH INPUT CHAR RATE (CHAR/SEC)	8.7	11.6	0.	0.	0.	0.
BATCH OUTPUT CHAR RATE (CHAR/SEC)	0.	0.	0.	0.	0.	0.
DAC CHARACTER RATE (CHAR/SEC)	0.	0.	15.5	17.9	13.3	15.3
USER THINK TIME (SEC)	9.0	20.5	22.1	28.3	31.4	52.5
MACHINE RESPONSE TIME (SEC)	0.	0.	2.5	4.4	1.7	2.4
INTER-OUTPUT TIME (SEC)	0.	0.	0.	0.	0.	0.
% TERMINAL USAGE	5.582		77.027		84.1	
# INPUTS	20.0		157.0		128.0	
AVG # INPUTS	6.7		39.3		32.0	
# OUTPUTS	23.0		499.0		378.0	
AVG # OUTPUTS	7.7		124.8		94.5	
FLAG	0		0		0	

1 WORD-TO-CHARACTER CONVERSION DIFFERS FOR DAC AND REMOTE BATCH-
DAC : CHARACTERS = # WORDS * 4 - 2
BATCH CHARACTERS = # WORDS * 6

2 FLAGS:
0 - NORMAL LOG-ON, DATA COLLECTION, TERMINATION.
2 - DUPLICATE ID ENCOUNTERED DURING LOG-ON. OLD ID LOGGED-OFF.
5 - TERMINAL LOGGED-ON VIA SUBROUTINE INSERT. NON-STANDARD PROCEDURE.
THIS FLAG HAS BEEN DELETED FOR NON-BATCH TERMINALS.

Figure 9-7. Terminal ID Summary Report

- DAC character rate (char/sec) - Total number of DAC characters divided by terminal session length.

- User think time (sec) - Time from start of last output transfer in output group to end of input transfer.

- Machine response time (sec) - Time from end of input transfer to request for next input transfer. See definition in section 9.3.

- Inter-output time (sec) - Time from start of previous output transfer to start of succeeding output transfer.

- % terminal usage - The percent of the monitored time this terminal ID was active. Calculated by summing up the total terminal connect time and dividing by the total session length.

- Number inputs - Total number of user responses during the time period

- Average number of inputs - Average number of user responses per session (number of inputs/number of sessions collected)

- Number of outputs - Total number of system responses during the time period

- Average number of outputs - Average number of system responses per session (number of outputs/number sessions collected

- Flag - Logical flags explained in the printout

9.5.4 Delta Time Period Summary Report. This report (figure 9-8) is used to monitor overall communication activity on the system as a function of time. It shows the total number of characters input and output, in DAC and remote batch modes, during consecutive time periods. This report is produced when the time period to be used is specified using the DELTA input option (subsection 9.6.2).

Up to four DN355s can be configured. In multi-DN355 environments, this report can show whether the loads on the two systems are balanced. These reports also show the number of different terminals that were active during each time period.

The times, shown in the left hand column, are 24-hour wall clock times. Interspersed in these reports are messages reflecting the aborting or rebooting of either DN355.

9.5.5 Histogram Reports. These reports are produced only if the user requests them with the HISTG input option (subsection 9.6.3). Three

OPCODE	DESCRIPTION
11	Output not available
16	Reject request (temporary)
17	Reject request (permanent)
20	Terminal rejected
110	Backspace output

These opcodes indicate a delay in data transmission or a communications problem. If these opcodes show up consistently, and in significant numbers, a detailed analysis should be conducted.

9.5.10 Response Time Report. This report is produced whenever the user sets the interval time using the input option RATE (subsection 9.6.11) or SNUMB (subsection 9.6.12). The report shows, for each interval, the time of day, the response time for the requested subsystems, and the number of opcode rejects, RSVPs and RJMs. (See figure 9-16). The column headings are as follows:

TOD - Time Of Day

RESP - average response time over the time period

I/R - average response time of those responses considered acceptable (see sections 9.5.6 and 9.6.6)

#I - number of responses in the acceptable range

#O - number of responses in the unacceptable range. This number is important in validating the figure in the RESP columns. One extremely bad response can cause a skewed average response.

TRM - average number of terminals on this subsystem during the time frame

OPREJT - number of Opcode Reject Temporary commands received during the period

OPREJP - number of Opcode Reject Permanent commands received during the period

RJM - number of Reject Message commands received during the period

RSVP - number of Resend requests received during the period

NOTE: If TSS is one of the SNUMBs requested, all TS SNUMBs (TS1-TS4) will be represented under TSS.

9.5.11 Error Messages. The CAMDRP can produce multiple error messages relating to the data type. Most of these messages are actually warning messages, which the CAMDRP will try to recover from and will continue to process.

The most prevalant error message is the warning message "TERMINAL ID NOT FOUND." This message usually occurs when a terminal has been logged onto the system prior to the CAM starting to collect its data. When the CAMDRP tries to find a particular user who is receiving or transmitting data in its tables, that user will not be found since the CAMDRP did not find any log-on record for him. The user is logged onto the system and the CAMDRP continues processing.

The main reason for the CAMDRP to abnormally stop processing is the error message "NO MORE ROOM IN TERMID ARRAY." This means that an internal array has been filled. This is usually the terminal ID array. The parameter MAX must be increased to enlarge the required arrays. The current size of MAX is 50. This can be exceeded if there are a large number of users on the system when the CAM is started. To increase this value, the user should log onto TS1. Enter EDIT 0 B29IDPXO/SOURCE/CAM. Then enter:

```
CASE
VERI
RS:/MAXb=b50/;*:/MAXb=bxx/
```

where xx is the new maximum number of terminals to be allowed on the system. The CAM data reduction program will be increased by 175 words for each terminal above 50 allowed. All other messages produced will be self-explanatory. If they do not indicate a severe error, the words "For Information only" will appear with the message.

9.5.12 H6000-DN355 Reject Report. This report displays all the terminal IDs that have had some type of error opcode from or to the DN355. These opcodes are RJM, RSVP, ECHO, OPCRJT, OPCRJP. This report also lists all the terminals seen on all the datanets (see figure 9-16.1).

9.5.13 Abort/Disconnect Report. This report indicates each time the DN355 aborts and is reinitialized. It also presents each time specified line IDs (option DISC) disconnect. These disconnects indicate the line ID, the subsystem it was connected to, when it disconnected, how long it had been connected and the number of inputs/outputs associated with the line ID during the session. This report can be used to monitor how often the WIN lines lose their connections (see figure 9-16.2).

9.5.14 TS1 Initial Parameter Report. This report indicates the initial preset values for TS1. These values are SIZE parameters, LIMIT parameters, SWAP FILES parameters and a list of all ALLOCATED DEVICES per file code. This report is produced once, so if any parameters are changed during the run (such as TS1 max size), the change is not reported. See figure 9-16.3 for a sample of this report.

9.5.15 Mailbox Busy Report. This report is printed out each time a Response Time Report line is printed. This report indicates the time of day, the datanet, the total number of busy mailboxes during the time frame, the total number of times the mailboxes were looked at (number of responses), the total number of mailboxes available during that time frame (number of responses * seven mailboxes), the percent of the mailboxes busy, the number of mailbox denials, if any, the percent of the mailboxes available that were denied, the maximum mailboxes busy during the time frame, and the maximum number of denials seen at any one time (see figure 9-16.4).

RESPONSE TIME REPORT FOR NMCC ON 030382

	TSS						FTS							TLCF								
TOD	RESP	I/R	# I	# O	USER		RESP	I/R	# I	# O	TRM		RESP	I/R	#	I . . .	OPREJT	OPREJP	RJM	RRSVP
12:38:01	0	0	659	7	13	I	1	1	8	0	1	I								
12:43:01	0	0	835	10	15	I	2	2	2	0	2	I	0	0	3	. . .	1	0	0	0
12:48:01	0	0	849	6	18	I	2	1	43	1	4	I	6	6	1	. . .				
12:53:01	2	0	604	6	18	I	9	2	32	2	4	I				. . .				
12:58:02	2	0	469	7	18	I	19	3	14	1	4	I				. . .				
13:03:02	2	0	247	4	18	I	39	1	5	2	4	I				. . .	1	0	0	0
13:13:03	1	0	976	6	17	I	7	1	33	1	4	I				. . .	7	0	4	0
TOTAL	6	2	4639	46	17		10	1	137	7	4			3	4					

Figure 9-16. Response Time Report

H6000 - DN355 REJECT REPORT FOR NMCC ON 021683

TERMINAL ID	RJM	RSVP	ECHO	OPCRJT	OPCRJP COMMANDS
A4	0	35	0	3	0
01	0	0	0	3	0
A4	0	0	0	1	0

DN/TERMINAL REPORT FOR NMCC2 ON 021683

TERMINALS ON DATANET 0

A6 A8 AQ A4 AA 02 01 AB AT AD A0 AL AJ AF AR A2 AP A7 AN AM A5 AS

TERMINALS ON DATANET 1

FJ CN CA F6 C6 C9 CK FM CT F3 F2 C8 CL CC FU FE FV CE CM CV CI CP F7 CJ C7 CO F4 FI FN C2 CR CD

Figure 9-16.1. H6000-DN355 Reject Report

```
                    ABORT REPORT FOR NMCC  ON 030382

TERMINAL ID BP ON SUBSYSTEM UNKNWN DISCONNECTED AT 12:57:12 AFTER   246 SECS WITH   876 INPUTS AND   876 OUTPUTS
TERMINAL ID BP ON SUBSYSTEM NACE-U DISCONNECTED AT 12:57:29 AFTER     3 SECS WITH     6 INPUTS AND     7 OUTPUTS
TERMINAL ID B4 ON SUBSYSTEM UNKNWN DISCONNECTED AT 12:57:49 AFTER   283 SECS WITH   876 INPUTS AND   876 OUTPUTS
TERMINAL ID 02 ON SUBSYSTEM UNKNWN DISCONNECTED AT 13:04:39 AFTER   692 SECS WITH     0 INPUTS AND   280 OUTPUTS
TERMINAL ID 01 ON SUBSYSTEM UNKNWN DISCONNECTED AT 13:04:39 AFTER   692 SECS WITH   599 INPUTS AND   599 OUTPUTS
                    ***** ABORT 355-0 AT 13:28:35 AT RCDCNT     144
```

Figure 9-16.2. Abort Report

TS1 INITIAL PARAMETER REPORT

SIZE PARAMETERS

INITIAL TS1 MAX SIZE	180K	SIZE GROWTH FACTOR	20K
MINIMUM TS1 SIZE	60K	SIZE REDUCTION FACTOR	20K
MAX TIME ALLOWED FOR SIZE CHANGES	60SECS	MAX TIME ALLOWED BETWEEN GMORE REQUESTS	10SECS
MEMORY SIZE REDUCTION TIME INTERVAL	120SEC		

LIMIT PARAMETERS

MAX NUMBER OF TERMINALS	90	MAX NUMBER CONCURRENT DRL TASKS	4
LARGE SUBSYSTEM SIZE FENCE	20K	LARGE SUBSYSTEM WAIT TIME PENALTY	8
NUMBER OF 32MS TIME QUANTUMS	8	FREQUENCY OF PRIORITY B DISPATCHING	1
RECONNECTION TIME LIMIT	300SEC		

SWAP FILES

NUMBER OF SWAP FILES IN USE	2	SWAP FILES IN USE: #S #T	
MIN SWAP FILE SIZE	1200LLINKS	MIN SWAP FILE GROWTH SIZE	300LLINKS

ALLOCATED DEVICES

FILE	DEVICE/FILE NAME
#D	DQ1
#P	
#Q	
.D	.D
SS	
#S	
#T	

Figure 9-16.3. TS1 Initial Parameter Report

MAILBOX BUSY REPORT FOR NMCC2 ON 062582

TIME OF DAY	DN	BUSY MAILBOXES	# MBX CHECKS	POSSIBLE MAILBOXES	% BUSY	DENIALS	% DENIED	MAX BUSY	MAX DENIED
17:44:52	0	3606	12273	85911	4			3	
17:44:52	1	10110	12273	85911	12	1	0.001	7	1
17:54:52	0	3883	12653	88571	4			3	
17:54:52	1	10153	12653	88571	11	10	0.011	5	2
18:04:55	0	3090	7736	54152	6			2	
18:04:55	1	5304	7736	54152	10	1	0.002	6	1

Figure 9-16.4. Mailbox Busy Report

```
CARD   1   HISTG
CARD   2   B   C   D
CARD   3   E   F   G...
CARD   4   H   I   J...
CARD   5   K   L   M...
```

Where

B = Number of subsystems wanted
C = Number of device types wanted
D = Number of terminal IDs wanted
E,F,G = Up to 10 subsystem names separated by at least one blank (may go to more than 1 card)

H,I,J = Up to 10 device types separated by at least one blank (may go to more than 1 card)
K,L,M = Up to 20 terminal IDs separated by at least one blank

Figure 9-18. Histogram Reports, Input Option HISTG

9.6.8 Terminal Mailbox Dump (Action Code MAIL). This option allows the user to get a dump of the terminal traffic collected for the specified terminal IDs. (Reference subsection 9.5.2.2) This output can be in ASCII, BCD, OCTAL, or all three. See figure 9-19 for the format of this option. NOTE - this option will turn on the LIST option.

9.6.9 Terminal Busy Limit (Action Code BUSY). This option allows the user to change the threshold for the High Terminal Usage Report (subsection 9.5.8). Whenever a terminal is connected to the system for greater than the desired limit, the terminal ID will be printed. Two cards are required for this option. The first card has the word BUSY on it and the second card contains a % busy limit value.

9.6.10 W6.4/2H Data Reduction (Action Code RN). This option allows the user to process a GMF data tape (W6.4/2H or W7.2/4Jx) under a W6.4/2H software release. It consists of the letters RN on a data card.

9.6.11 Response Time Report Time Frame (Action Code RATE). This option allows the user to produce a report (subsection 9.5.10) giving the average response time over a time interval for both TimeSharing and all subsystems combined. This option requires two data cards. The first card contains the word RATE and the second card contains the number of minutes between response time printouts.

9.6.12 Response Time Report SNUMB (Action Code SNUMB). This option allows the user to produce response times for up to three different DAC subsystems (subsection 9.5.10), giving the average response over a time frame for the system and each requested SNUMB. This option requires three data cards. The first card contains the word SNUMB. The second data card contains the number of SNUMBs to be used. The last data card contains these SNUMBs.

NOTE: If one of these SNUMBs is TSS, all TSS logons (TSS, TS1, TS2, TS3, TS4) will be presented under the heading TSS in this report. The user can also request a separate column for any of the TS SNUMBs.

9.6.13 Disconnect Report Line IDs (Action Code DISC). This option allows a user to define up to 10 different line IDs to be reported on the Abort/Disconnect Report every time they disconnect (see section 9.5.13). This option consists of three data cards. The first card contains DISC. The second card contains the number of line IDs to be monitored. The third card contains the specified line IDs, separated by a blank.

9.6.14 Terminate Input Options (Action Code END). This option is required as the last input option data card. It may be the only data card if standard default options are selected. It consists of the word END on a data card.

9.6.15 Default Options. The default options for the variable input are as follows:

ACTION CODE	Option	Default Value
TIME	Timeframes	None, total tape processed.
DELTA	Delta Time-frames	None, this report is not processed. If Delta time is given but not the word COMPRESS, all data are printed.
HISTG	Histograms	None, no histograms produced.
LIST	Trace	None, report data reduction is done, not trace dump.

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Similarly, the columns headed INDIV. PRC and CUMUL. PRC give the individual and cumulative percentages of all responses which were made within each time range. In figure 10-13, we observe that 48% of all responses were 1 second in duration, while 51% were between 2 and 3 seconds in duration. At the same time, it can be observed (CUMUL. PRC) that 100% of all responses were measured at 3 seconds or less.

10.6 Default Option Alteration

The DDRP uses the trace tape generated by the GMC and user data cards as input. The user has several optional inputs. These options are evoked by specifying an input option (action code) and any other required inputs specified in the following subsections. The general format for an option request is as follows:

The first card is an action code describing the action to be taken. Subsequent cards modify report parameters for some of the action codes. All inputs are free format with the only requirement being that all zeros must be typed on the data card. At least one data card with the word END specified is required as the last data card.

Available action codes (and default implications) (and character code) are:

1. Turn histogram on; (no histograms) (HISTG)

2. Modify a plot; (standard plots) (PLOT)

3. Turn a specific report on; (all reports on except ID TRACE, MATCH, and histograms) (ON)

4. Turn a specific report off; (all reports on except ID TRACE MATCH, and histograms) (OFF)

5. Set a timespan for measurement; (time not a criterion for measurement) (TIME)

6. Process Data Reduction Program on a WW6.4/2H system (WW7.2/4JS processing) (RN)

7. Turn all reports off except those specified; (all reports on except ID TRACE, MATCH, and histograms) (ALLOFF)

8. Turn all reports on except those specified; (all reports on except ID TRACE, MATCH, and histograms) (ALLON)

9. Do not stop on an option request error; (stop on an input error) (ERROR)

10. Number of physical tape records to process before stopping; (number of records not a constraint) (NREC)

11. All reports off except plots; (all reports on except ID TRACE, MATCH, and histograms) (REPORT)

12. Dump formatted record types listed; (no dump) (TRACE)

13. DATANETs not to analyze for plots; (all are plotted) (NOPLOT)

14. Set minimum plot interval; (five minute plot interval) (INTERV)

15. Verify response time records (type 2) matched (at end of processing of each T62 trace) (no verification) (MATCH)

16. Accept line IDs for special analysis; (none get special analysis) (SPECL)

17. Modify threshold values (all values 9999999) (THRESH)

18. DATANETs not to analyze for reports other than plots; (all nets are analyzed) (NORPT)

19. Debug (no debug) (DEBUG)

20. Modify parameters for histograms (default values described in section 10.4) (CHANGE)

21. Error Report (all unmatched responses produced) (DUPLIC)

22. Reject Report (reject messages are produced but summary is not) (REJECT)

There is no order required for the options, and multiple entries in each are permissible. If several inputs refer to the same report, the last one encountered will have precedence. Also, if a report is off by default and is modified, it will be turned on through its request for modification. All input cards are free format unless otherwise described. If multiple parameters occur on a given card they must be separated by at least 1 blank column.

Three tabular reports depart from the normal scheme (see table 10-1): the reports titled "List of Active Line IDs" and "Response Interval Unmatched Pairs Verification" are generated if a T62 trace is processed and cannot be turned off. The report titled "Response Reject Messages" is also produced by default and can only be altered with the REJECT user option.

interpretation and corrective action (202-695-0856). The occurrence of errors will, as a rule, invalidate the run.

All tape handler messages, including tape error messages, are found on file code 7. The following messages are of informative value and are generally self explanatory.

- "MOUNTING ANOTHER REEL #..."
- "END REACHED IN NXTREC AT RCDCNT ..."
  Explanation: A tape or operator error forced the tape handler to treat the condition as an end-of-file. This message may be preceded by the following
- "ERROR ON THE TAPE READ"
- "TAPE MOUNTED APPEARS INCORRECT BUT IS NEW ... PROCESSING WILL CONTINUE ..."
  Explanation: A newly mounted continuation reel does not conform to continuation conventions, but is also not positively incorrect. The run is probably invalid.
- "INCORRECT TAPE MOUNTED 3 TIMES OR NEXT TAPE CANNOT BE READ. RUN ENDED".
  Explanation: A newly mounted continuation reel is positively incorrect. This will be preceded by
- "WRONG TAPE MOUNTED. WANTED ..."
- "JULIAN DATES DO NOT AGREE. RUN ENDED"
  Explanation: A new physical record bears an incorrect Julian date. This event may result from re-using an old GMC data tape in another collection run in which GMC termination was improper or incomplete.
- "GMFEXC FOUND END OF TAPE ON FIRST READ"
- "GMFEXC ERROR: FIRST RECORD IS IN ERROR OR WRONG TAPE MOUNTED. PHYSICAL RECORD DUMPED".
  Explanation: The occurrence of this message is of concern to C751 only if there was no tape mounting or tape number confusion. This may be preceded by
- "GMFEXC ERROR: ASKED FOR TAPE #... GOT ..."
  Explanation: The NEW option was used, and the user specified tape number does not agree with the number found on the NEW tape.

All other tape handler messages are of concern to C751 and should be reported for correction.

Debug output, when selected, shares file code 7 with the tape handler.

11.5.2 Central Processing Unit Monitor Reports. The CPU title page is printed to file code 14, immediately ahead of any histograms. The title page contains a summary of the systems configuration, the time reduction effectively started and stopped, as well as identifying the system which was monitored and the tape numbers containing the data set.

Following this information is a list of all dispatcher options that were active. This information is obtained from word 0 of the dispatcher module (.MDISP). If Priority B processing was enabled, then the SNUMBs being granted Priority B processing will be listed.

The user can alter the dispatcher algorithm to satisfy particular installation requirements. The three most commonly used algorithms are Urgency Thruput, I/O Priority and Priority B processing. If none of these options are selected, job urgency and channel time will be ignored and the standard rules for job selection will be observed. In effect, the standard rules imply a First-In/First-Out mode of operation.

While the dispatching algorithm involves some rather complex decisions, the primary driving force behind the algorithm is the urgency of a job. When the I/O Priority option is set, a job's urgency code is computed at 192 millisecond intervals of processor time. If the job is an ordinary slave program and its urgency code is not 0, the code is reduced by 1. Each time an urgency code is reduced to 0, a processor-bound job is dispatched at the next dispatch. If a job is a priveleged slave program, or if its urgency code is 0, the urgency code is recomputed as follows:

Urgency Code = L+T

where T = 1 if total channel time is at least equal to total processor time; otherwise T = 0.

L = 0,1,2,3,4 depending on the ratio of local channel time to local processor time.
set to 0 if ratio $<$ 1:1
set to 1 if ratio $\geq$ 1:1 $<$ 4:1
set to 2 if ratio $\geq$ 4:1 $<$ 16:1
set to 3 if ratio $\geq$ 16:1 $<$ 64:1
set to 4 if ratio $\geq$ 64:1

When the Urgency Thruput option is set, a job's dispatcher urgency is computed whenever the job's dispatcher urgency reaches 0. The dispatcher urgency is reduced by one each time the job is placed in the queue. A job's dispatcher urgency is computed as (U+2)/8 where U is a job's processing urgency from .CRSN1. This formula explains why it is very important to ensure that system programs and priority jobs are given processing urgency levels (U value) significantly higher than the ordinary slave job. Assume that $PALC has a processing urgency level of 54 and a

```
 CPU AND TAPE REDUCTION, VERSION 7.2 - TEST, 28 SEPTEMBER 198
ELAPSED (PROCESSOR) TIME IS     1806.06 (    3612.12) SECONDS ON SYSTEM NMCC2  AT  1241:40.061 MON 82-09-13
CPU TIME (EXCEPTING OVERHEAD AND IDLE) IN HUNDREDTHS SECOND, # OF DISPATCHES, SERVICE TIME IN CLOCK PULSES
% CPU OF TOTAL CPU, % OF TOTAL DISPATCHES SINCE RUN START (DS1) AND % OF TOTAL DISPATCHES SINCE LAST PRINT (DS2)
     CALC    PALC    SYOT    RTIN    T/DS    LOGN    FSYS    HEALS    GMC     TSS     NCP    TLNT    FTS    TLCF    TRAX    USER
CPU   493    1398    2752     221       0     367       0        0     13   23780    1499     186   1682       1       0  120361
DSP  1765    5072    4937     708       0    2499       0        0     67  100832    2983     498   3970       6       0   55355
STM   178     176     356     200       0      94       0        0    133     150     321     239    271     134       0    1391
CP% 0.14%   0.39%   0.76%   0.06%   0. %   0.10%   0. %    0. %   0.00%   6.58%   0.42%   0.05%  0.47%  0.00%   0. %  33.32%
DS1 0.80%   3.41%   2.32%   0.33%   0. %   1.18%   0. %    0. %   0.05%  49.37%   1.60%   0.90%  1.22%  0.00%   0. %  38.25%
DS2 0.78%   2.99%   2.46%   0.32%   0. %   0.68%   0. %    0. %   0.05%  39.72%   2.40%   1.64%  1.39%  0.00%   0. %  47.44%

TSS:          CPU IN HUNDREDTHS SECOND                    NUMBER OF DISPATCHES                SERVICE TIME IN CLOCK PULSES
              TS1     TS2     TS3     TS4                 TS1     TS2     TS3     TS4          TS1     TS2     TS3     TS4
EXEC        11730       0       0       0               82132       0       0       0           91       0       0       0
SDSP        12049       0       0       0               18700       0       0       0          412       0       0       0

TSS:      % OF TOTAL DISPATCHES SINCE RUN START      % OF TOTAL DISPATCHES SINCE LAST PRINT
              TS1     TS2     TS3     TS4                 TS1     TS2     TS3     TS4
EXEC       36.08%   0.%     0.%     0.%                29.75%   0.%     0.%     0.%
SDSP       13.28%   0.%     0.%     0.%                 9.97%   0.%     0.%     0.%

OVERHEAD, IDLE, GATE LOOP TIME IN HUNDREDTHS SECOND (GATE LOOP ALSO INCLUDED IN OVERHEAD)
          CPU 1   CPU 2   CPU 3   CPU 4   CPU 5   CPU 6   TOTAL
OHEAD     32796   10580       0       0       0       0   43377
IDLE     109875   56832       0       0       0       0  166708
GLOOP       557     657       0       0       0       0    1215

# CPUS, % SYSTEM CPU,    % TSS CPU,    % WIN CPU,    % TRAX CPU,    % USER CPU,    % IDLE TIME & % GATE LOOP OF BUSY...SINCE
  2.00          13.46          6.58          0.93           0.            33.32          46.15          0.62          RUN START
  2.00          16.19          9.69          0.05           0.            46.70          27.94          0.58          LAST PRINT
```

Figure 11-7. CPU Time Report (Part 1 of 2)

QUEUE TIME IN TENTHS SECOND, AVERAGE QUEUE TIME PER DISPATCH IN CLOCK PULSES AND % QUEUE OF ELAPSED-TIME SINCE RUN START

	CALC	PALC	SYOT	RTIN	T/DS	LOGN	FSYS	HEALS	GMC	TSS	NCP	TLNT	FTS	TLCF	TRAX	USER
QUE	124	188	75	16	0	8177	0	0	2	472	4227	25	2484	3746	0	16477
AVG	450	238	97	145	0	20941	0	0	205	29	9069	327	4005	3996174	0	1905
QU%	0.69%	1.05%	0.42%	0.09%	0. %	45.28%	0. %	0. %	01.01%	2.62%	23.41%	0.14%	13.76%	20.74%	0. %	
---AVERAGE QUEUE POSITION WHEN IN QUEUE (OR PROCESSOR)																
AQP	2.00	1.33	1.29	2.00	0.	1.17	0.			0.99	1.07	2.00	1.36	0.		

QUEUE TIME IN TENTHS SECOND, AVERAGE QUEUE TIME PER DISPATCH IN CLOCK PULSES AND % QUEUE OF ELAPSED-TIME SINCE LAST PRINT

	CALC	PALC	SYOT	RTIN	T/DS	LOGN	FSYS	HEALS	GMC	TSS	NCP	TLNT	FTS	TLCF	TRAX	USER
QUE	58	103	12	6	0	768	0	0	1	235	5	2	3	0	0	7541
AVG	634	298	372	123	0	11525	0	0	528	31	409	770	598	409	0	1610
QU%	0.96%	1.72%	0.21%	0.11%	0. %	12.72%	0. %	0. %	0.02%	3.89%	0.10%	0.04%	0.05%	0.00%	0. %	
---AVERAGE QUEUE POSITION WHEN IN QUEUE (OR PROCESSOR)																
AQP	2.33	1.44	1.00	2.00	0.	0.	0.			0.96	0.	0.	0.	0.		

TSS:

	QUEUE IN TENTHS SECOND				AVG QUEUE TIME IN CLOCK PULSES			
	TS1	TS2	TS3	TS4	TS1	TS2	TS3	TS4
EXEC	438	0	0	0	34	0	0	0
SDSP	0	0	0	0	0	0	0	0

AVERAGE QUEUE LENGTH WAS 1.39 SINCE RUN START, 1.50 SINCE LAST PRINT.

Figure 11-7. (Part 2 of 2)

The second line of print in this block gives the accumulated number of dispatches for each of the associated programs. The service time for each program is presented on the third line. This figure is calculated by dividing the accumulated CPU time by the accumulated number of dispatches. This figure is then converted to clock pulses (1/64 ms). The fourth line in this block indicates what percentage of the total processor power is being used by each of the associated programs. This figure is based on 100% power availability. Therefore, if the operating system is using 30% processor power on a 3-processor system, it would be using (30%)(3) = 90% of a processor. The final two lines of print in this block provide an indication of what percentage of total dispatches is being used by this program. A program using a large percentage of dispatches for a small percentage of processor time is an indication of a program which is getting poor utilization of the processor and possibly asking for the processor an excessive number of times. When TSS is in Priority B mode, it will display this tendency.

The third set of print provides, for each copy of Time Sharing (TSS), the CPU time attributable to the executive phase and to the subdispatch phase. In addition, for each copy of TSS, the average service time is also presented. This figure is represented in clock pulses (1/64ms). This figure represents the average amount of CPU time used by TSS whenever it received control of the processor. By tracking this figure, it is possible to see if bad periods of TSS response coincide with periods of time when TSS was receiving inadequate time slices of CPU service. The service time is calculated by taking the total CPU time accumulated by TSS and dividing it by the total number of CPU bursts accumulated by TSS.

The next block of print shows the percentage of dispatches being given to both the executive and subdispatching.

If the user has selected the option to monitor special SNUMBs, the next block of print will list each of the special SNUMBs under which will appear the total CPU time accumulated by each of the SNUMBs. This block of print is not shown on the sample figure.

The next block of print shows the amount of overhead, idle and gate-loop time accumulated by each processor and by total. Gate-loop data is not applicable in a single processor environment. Gate loop time is that amount of time a processor is locked from executing because another processor has locked a required table or blocked a given area of code. In a multiprocessor environment, there are many instances where one processor is required to alter the values in a given table. While these values are being changed, the system wants to ensure that another processor does not reference the table, while it is in the midst of being changed. To prevent this from happening, the system will lock the table while it is in the midst of being altered. If a second processor desires to reference a locked table, it is required to execute a CPU "dead" loop while it waits for the table to be opened. The GLOOP statistics display the amount of

such loop time executed by each processor. This value will not be reported for a single processor environment but should appear for any multiprocessor environment where the software release was WW7.2/4JS. If this data is not reported, it indicates a problem with the GMF collector and CCTC should be contacted.

The final block of print is a percentage breakdown of CPU usage into the categories SYSTEM, TSS, TRAX, WIN, USER, and IDLE; also shown are the percentage of gate-loop time relative to processor busy time and the time corrected number of processors in use. These figures are printed both for the current 10-minute interval and for the total current reduction interval. This allows the user to track when peak usage of CPU power is occurring and what portion of the system is using this power.

Notes: (1) SYSTEM time includes CPU time accumulated in the "functions" OVERHEAD, CALC, PALC, SYOT, RTIN, TDS, LOGN, FSYS, DMTEX and MONITR. The time attributable to WIN, TSS and TRAX is neither SYSTEM nor USER. (2) The definition of overhead time is the time spent in the interrupt handler, the dispatcher and the SWAP processor, plus all gate-loop time. (3) It should be noted that the percentage figures are based on total CPU power and therefore add up to 100% (excluding the gate-loop percentage). In order to determine the "amount of a processor" required or used by a given function, it would be necessary to multiply the percentage figure for the function by the time corrected number of processors in use.

If the user has disabled the dispatcher queuing option of the CPU Monitor, the above blocks of output will occur two per page. If the dispatcher queuing option is enabled, then several blocks of output will be presented which depict the level of queuing occurring on the system.

The first block presents three lines of output for the same set of jobs as listed in the processor usage portion of the report. The total queue time accumulated by the job is given in line 1, the average queue time per dispatch is given in line 2 (presented in clock pulses) and the percent of elapsed time for which this job was in queue is presented in the third line. This final figure is not provided for the user entry. These three lines of output are accumulated data, since the start of the run. The next line of output indicates the average position this job held in the dispatcher's queue. If the job was being serviced by the processor, when the queue was examined, its relative queue position is considered to be zero.

These same four lines of output are repeated, but the data represents the various jobs' queuing statistics only since the last print out.

The final two blocks of output provide queuing statistics for the TSS and all special jobs selected for analysis. It should be noted that all TSS queuing statistics are for the executive only. Subdispatch queuing is not currently monitored.

11.5.2.5 CPU Plot of Percent Idle (File 31). This plot report shows the percentage of CPU power that is idle during each 10-minute (default period) interval. The data is taken directly from the CPU Time Report described in subsection 11.5.2.4. One horizontal line is output for every CPU Time Report table. The horizontal line represents one increment on the X-axis and it "paints" one datum of percent idle and the change of that datum since it was last plotted. Every 10th line also displays the current time of day. By the nature of the printing mechanism, an ordinate position is a cell, a range of values. The cell width is specified by a DELTA value given in the heading. The plot contains a heading line giving the system id, starting time of reduction and the date. It also contains the report title, and identifying mark, "A" here, of the curve, and the DELTA value. A plot summary, if not user deactivated, follows each plot. Following the summary is the overall system idle percentage in three intervals; zero to 25% idle, 25 to 50% idle and 50 to 100?% idle. A final line shows the plot interval in seconds (default is 600 seconds). Figure 11-8 is a sample of this plot.

11.5.2.6 WIN Report. This report will be generated under the same time interval control as is used for the CPU Time Report (subsection 11.5.2.4) (default value every 10 minutes). Figure 11-9 is a sample of this report (no WIN software was active at the time this sample report was generated). For each WIN program, a single line of information is presented. This line indicates the total amount of CPU time accumulated by the program during the specified time interval, the number of CPU bursts accumulated during the time interval and the rate (bursts/sec) at which the bursts were generated. This report can be used to track those periods of time when WIN programs were using excessive CPU time or, on the other hand, were being denied CPU service.

11.5.2.7 CPU Access by SNUMB Report. This report (figure 11-10) summarizes CPU usage and queuing statistics for every activity processed during the monitor session. The various columns of the report are self-explanatory and require no special explanation, except for the CPU-SYST and CPU-TRACE columns. The former column indicates the amount of CPU time charged to a job from the accounting system. The latter column indicates the amount of time the processor was actually allocated to a job according to the execution of the various special traces generated by the CPU Monitor. This number will tend to be somewhat larger than the value determined by the accounting system. If a set of asterisks appear, for a given job, under the Average Queue Position column, this is an indication that this job was never caught in the processor queue. It should be stressed that the processor queue is not analyzed continually. Rather, the queue is examined under a sampling scheme and, therefore, it is possible that a given job will never be caught in the processor's queue.

11.5.3 Tape Monitor Reduction Reports. The tape reduction title page is identical to the CPU reduction title page (see subsection 11.5.2), except that the configuration described is pertinent to the tape subsystem.

Shown are the channel number, the IOM number, the number of drives configured to the channel, the type of drive and whether the drives are cross-barred. The data shown is the configuration as presented in the boot deck. If any drives have been taken off line for maintenance or repair, it will not be reflected. The title page precedes any histograms; an example is presented as figure 11-11. It is written to file 14.

11.5.3.1 Number of Tape Drives in Use (Time Corrected) (File 14). A histogram report, seen as figure 11-12, shows the number of tape drives in use at the sampling epoch. The data are corrected for the inter-sample period, so that the figures listed under the heading "INDIV. PROB." correctly represent the fraction of reduction time the corresponding "NUMBER (of) DRIVES" were in use.

11.5.3.2 Tape Activity Report (File 13). This tabular report is made for each activity of a job that used tapes. For each activity of a job, the tapes used by that activity are described by type, unit number, and channel number. The report also presents how long the activity was

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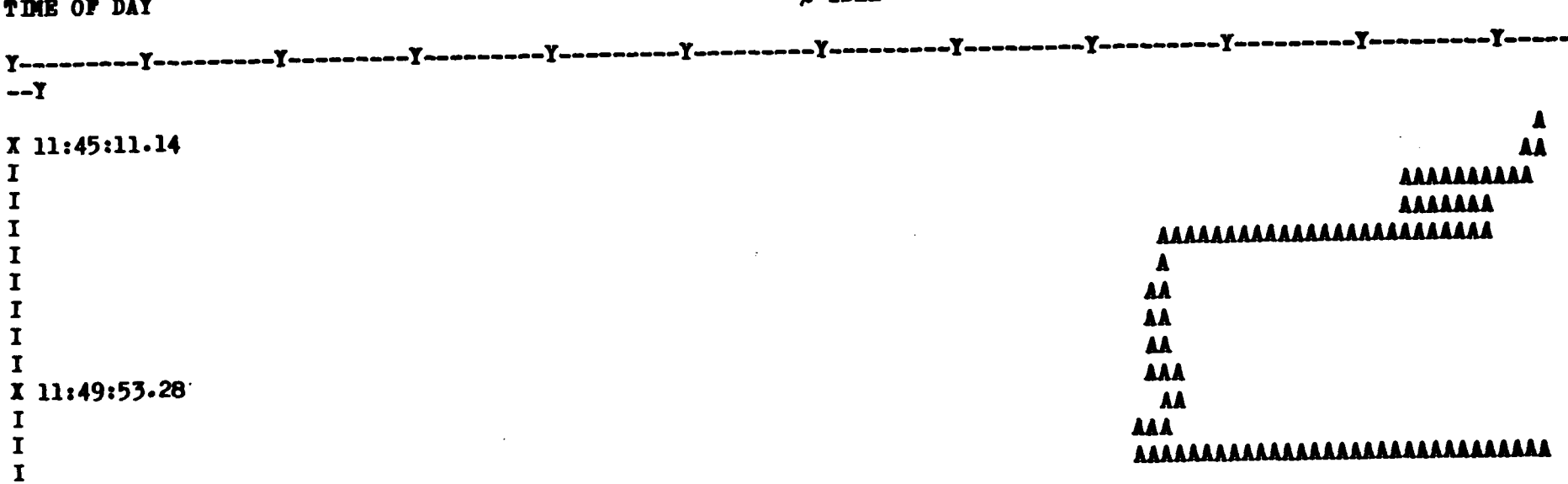
CPU AND TAPE REDUCTION, VERSION 7.2 - 11.74, 24 SEP 1982

DISTRIBUTION COLLECTION ON SYSTEM NMCC2 AT 11:44:41 ON 82-12-15

CPU UTILIZATION OF SYSTEM/USER IDLE

PLOT-1

DELTA= 7.9365E-01 A=IDLE



CURVE	MINIMUM	MAXIMUM
IDLE	0.6600E 02	0.9300E 02

0. % 25% IDLE 0. % = 25% AND = 50% IDLE 100.00% 50% IDLE

THE PRINT PERIOD FOR THIS PLOT IS NOMINALLY 30 SECONDS

Figure 11-8. CPU Plot of Percent Idle

DISTRIBUTION COLLECTED ON SYSTEM DSCC1 AT 10[illegible]:54.955 TUE 82-01-19. INITIAL GMF TAPE # 1182

WIN REPORT -- TIME IN HUNDREDTHS SECONDS; RATE, 1/SEC

	NCP			TELNET			FTS			TLCF		
TIME	CPUTIME	BURSTS	BURST-RATE	CPUTIME	BURSTS	BURST-RATE	CPUTIME	BURSTS	BURST-RATE	CPUTIME	BURSTS	BURST-RATE
1015:54.385	0	0	0.	0	0	0.	0	0	0.	0	0	0.
1025:56.385	0	0	0.	0	0	0.	0	0	0.	0	0	0.
1035:58.074	0	0	0.	0	0	0.	0	0	0.	0	0	0.
1045:54.581	0	0	0.	0	0	0.	0	0	0.	0	0	0.
1055:59.947	0	0	0.	0	0	0.	0	0	0.	0	0	0.
1106:01.044	0	0	0.	0	0	0.	0	0	0.	0	0	0.
1116:03.416	0	0	0.	0	0	0.	0	0	0.	0	0	0.
1121:59.169	0	0	0.	0	0	0.	0	0	0.	0	0	0.

Figure 11-9. WIN Report

CPU AND TAPE REDUCTION. VERSION 7.2 - 11.74. 24 SEP 1982

DISTRIBUTION COLLECTED ON SYSTEM TS-7.2 AT 1730:20.349 WED 82-12-08. INITIAL GMC TAPE #00673

CPU ACCESS BY SNUMB

TIME OF TERMINATION	JOB SNUMB	CPU-SYST IN SECONDS	QUEUE TIME IN SECONDS	AVERAGE CPU QUEUE POSITION	MEMORY TIME (SEC)	PERCENT TIME IN QUEUE	ACTIVITY NUMBER	SWAP TIME (SEC)	CPU-TRACE IN SECONDS
1731:34	LCDTS	3.104E-01	2.704E 00	4.3	4.000E 00	67	1	0.	3.304E-01
1732:04	8247T	1.774E 01	5.883E 01	3.2	1.030E 02	57	1	0.	1.974E 01
1732:16	8278Z	1.686E 01	3.630E 01	3.8	7.700E 01	47	1	0.	1.886E 01
1733:31	8287T	3.230E 01	1.013E 02	3.5	1.890E 02	53	1	0.	3.430E 01
1734:09	8311T	6.848E-01	6.763E 00	4.6	1.000E 01	67	1	0.	7.048E-01
1734:09	8310T	8.323E 00	1.675E 01	2.8	4.100E 01	40	1	0.	8.523E 00
1735:22	8210T	3.156E 00	4.325E 01	2.1	5.700E 01	75	1	0.	3.356E 00
1736:34	8318T	1.585E 00	9.959E 00	4.1	2.100E 01	47	1	0.	1.785E 00

Figure 11-10. CPU Access by SNUMB